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ABSTRACT

This proceedings report presents the speeches and panel discussions given at an annual meeting held at the University of North Carolina; Asheville, that focused on improving general education at American colleges in two broad areas: history and culture, and mathematics and science. The report begins with lists of speakers, consultants, and participants and continues with selected excerpts from addresses, panel discussions, and workshop presentations. Briefly discussed are some issues of general education reform suggested by the faculty teams' post-conference reports on the impact of their work at Asheville. The report concludes with a 67-item bibliography. Speeches presented are as follows: "The Theory and Practice of Science: The Place of Science in General Education" (Robert Pollack); "'But 'twill serve'' (James Redfield); "Disciplinary Culture and General Education: What Can We Learn From Our Learners" (Sheila Tobias); "Predictors of Success in General Education" (Alexander S. Astin); "On Science and General Education" (Ezra Shahn); "General Education in History and Culture: Overview of Practices" (Carol G. Schneider); "The Purposes of General Education and Implications for Pedagogy" (Virginia Smith); "The Ecology of General Education" (Patrick J. Hill); "What They Took and What They Learned: Learning from Assessment and Transcript Analysis" (James L. Ratcliff); and "The Realpolitik of Reforming General Education" (Zelda F. Gamson). (GLR)

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JUNE 7-12, 1991

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ASHEVILLE INSTITUTE ON GENERAL EDUCATION

A PROGRAM OF THE ASSOCIATION OF AMERICAN COLLEGES
AND THE UNIVERSITY OF NORTH CAROLINA–ASHEVILLE
WITH FUNDING FROM THE EXXON EDUCATION FOUNDATION

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GENERAL EDITOR: MERRITT MOSELEY

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INTRODUCTION AND ACKNOWLEDGMENTS

In June 1991, the Association of American Colleges and the University of North Carolina–Asheville (UNCA) launched a major new effort to promote and strengthen general education in the nation's colleges and universities. This six-day annual summer program, the Asheville Institute on General Education, is being generously supported in its first two years by the Exxon Education Foundation, which also has provided funding for the publication of these proceedings of the first year's program.

In its aims and design, the Asheville Institute is distinctive. It seeks both to provide practical help to institutions working to improve their general-education programs and to build wider institutional and public support for such programs. These two broad purposes are served both by the selection of participants for the Institute and by its two-part structure.

Twenty AAC-member colleges and universities are selected competitively each year to send teams to the Institute. Applicants define particular tasks that they wish their teams to tackle—for example, the articulation of their institution's science and mathematics requirements, the implementation of an assessment program, or the inclusion of multicultural perspectives in an introductory humanities sequence. They also commit the time of an appropriate five-person faculty and administrative team, including in each case the institution's chief academic officer. The five-day working conference that constitutes most of the Institute provides the teams that are selected with a time and place for sustained work on the tasks they have defined. It brings them together with other teams working on similar challenges and provides them with a rich and stimulating program of presentations and workshops as well as ample opportunity to work with an array of experienced consultants.

Although the Asheville Institute on General Education is a valuable resource for practitioners, it also is more than that. The Institute opens with a one-day symposium in which thoughtful and prominent individuals from both within and outside the academic world join the participants in reflecting upon general education's connections with the needs and aspirations of the larger society. Each institution's team for this opening event includes not only the five core faculty members and administrators who remain for the working conference but two additional persons: the president, and/or a trustee, and/or a state policymaker. By encouraging these individuals' support for general education's improvement and reform, the symposium plays an especially helpful role in fostering change.

The Asheville Institute has yet one more aim: to increase the public's understanding of general education. The 1991 Institute is providing footage for a documentary on

that subject for public television. With support from both UNCA and the Exxon Education Foundation, North Carolina Public Television and an independent producer are developing an hour-long program for national distribution. Featuring numerous campuses around the country as well as the Institute, this program should be completed and made available later in 1992.

With special thanks to the Institute's co-director, UNCA Professor and Director of Humanities Merritt Moseley, who has edited these proceedings, AAC is pleased to provide in the following pages an overview of the 1991 program. This first year's Institute focused on improving general education in two broad areas: history and culture, and mathematics and science.

The proceedings begin with lists of speakers, consultants, and participants and continue with selected excerpts from addresses, panel discussions, and workshop presentations. Professor Moseley then briefly discusses some issues of general-education reform suggested by the faculty teams' reports and their work at Asheville. The proceedings conclude with a brief bibliography.

The 1991 Institute was well received, and AAC and UNCA look forward to building on its success. We invite all AAC-member institutions to consider applying to the program in future years.

We wish in closing to thank all of those whose vision and hard work contributed to the 1991 Institute. Asheville's historic Grove Park Inn provided a splendid site for the symposium, and North Carolina Public Television was an unobtrusive and very professional partner. At UNCA, two successive chancellors—David R. Brown and Roy Carroll—helped to initiate and shape the event, and an interested Board of Visitors readily gave helpful advice. In addition to Merritt Moseley, who ably led UNCA's involvement in the program, Lauren Wilson, vice chancellor for academic affairs, and Thomas Byers, special assistant to the chancellor, were especially helpful. Other UNCA staff members whose efforts we gratefully acknowledge include Salli Gaddini, Elaine Fox, and Robert Straub. Among AAC staff, Jane Spalding took a leading role in every phase of the Institute's planning and execution. Other colleagues, including Alexandra Maduros, Nancy Albert, Nora Topalian, Sherry Levy-Reiner, and David Stearman, made invaluable contributions to the Institute and these proceedings.

We are indebted to the speakers, panelists, and consultants listed on the following pages. They brought to the Institute a wealth of expertise, experience, understanding, and good humor that was greatly appreciated by the participants.

Of course, there could have been no Institute without the colleges and universities that took part; we thank warmly all those AAC-member institutions that applied for a place at Asheville. We also congratulate those teams that were selected; their post-Institute reports suggest that many used their time there extremely well.

Finally, AAC and UNCA gratefully acknowledge the generous support of the Exxon Education Foundation. Its funding provided a substantial subsidy to all participating institutions; a number who otherwise would have been unable to attend were able to take part as a result. The foundation also proved a source of many helpful and substantive ideas. It long has supported some of the best research on general education, and the Institute was able to bring these findings directly to the attention of campuses who could put such findings to work.

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Professor of Biological Science
Columbia University

JAMES REDFIELD
Committee on Social Thought
University of Chicago

SHEILA TOBIAS
University of Arizona

Panel moderator

DANIEL SCHORR
National Public Radio

Panel on mathematics and science

DAVID P. BILLINGTON
Professor of Civil Engineering and Operations Research
Princeton University

STUART BONDURANT
Dean, School of Medicine
University of North Carolina–Chapel Hill

JOAN GIRGUS
Professor of Psychology
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JAMES POWELL
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ROBERT WATSON
Director, Undergraduate Science, Engineering, and Mathematics Division
National Science Foundation

Panel on history and culture

PETER A. BENOLIEL
Chief Executive Officer
Quaker Chemical Corporation

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Professor of History
University of California–Riverside

THADIOUS DAVIS
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Professor and Director
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Earlham College

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ROBERT POLLACK

THE THEORY AND PRACTICE OF SCIENCE: THE PLACE OF SCIENCE IN GENERAL EDUCATION

General education intends to broaden a student's perspectives and to develop empathy for other world views. Yet experimental science—a world view of the utmost importance for all Americans—can be quite peripheral, even absent from what passes for general education. Meanwhile, every college and university is stuffed with science courses that result in remarkably little sympathy for or understanding of science by many if not most undergraduates. I would like to consider the barriers preventing general education from bringing science to nonscientists and propose some ways to do this right.

First, though, let me set a frame of urgency around what otherwise might be—in the wrong sense—an academic presentation. About 125 million persons are employed at some sort of job in this country; a full fifth of these are functionally illiterate. That means twenty-five million Americans hold menial jobs, and the major block to their advancement is their inability to read and write well. What is the place of science in their lives? It's either nowhere or, if anywhere, someplace close to magic. Sealed off from books, they also are far from anything scientists think of as science.

Suppose we make a leap of faith and say that functional illiteracy is the result not of lack of education but of inefficient and insufficient education. Let us assume, that is, that a typical high school education still raises a boy or girl above functional illiteracy; I hope this is so. What science do high school students learn?

This country has about thirteen million students in high school on a given day. Each year, some four million high school sophomores receive their first serious exposure to science—usually through biology but sometimes through chemistry, physics, or environmental science. Some of these tenth graders will go on to college, others not. Once in college, some will retain an interest in science from their high school courses, but the majority will not.

We are not here to discuss the proper number of scientists our country should be minting each year. We must be concerned, however, about the number, training, and enthusiasm of each year's crop of new science teachers. The steepest wedge in the progressive closing-off of bright young people's interest in science occurs just as they are entering college. It happens just as they are deciding whether or not to join the ranks of our nation's teachers.

Science cannot become more important in general education as long as it remains unimportant to students. Their repeated decisions to pull away from science are signs of an old, deep, cultural problem: the early separation of the intellectual worlds of scientists and nonscientists. General education in a liberal arts college is the proper place to bridge this great cultural divide. I would argue that the place of science in general education is

Science cannot become more important in general education as long as it remains unimportant to students

to assure that science, and the way scientists think and argue, becomes part of every student's exercise in learning to think for herself or himself.

It is essential that teachers know how to expose a future lawyer, political figure, military officer, or corporate leader to a dose of my world: to protect him or her from the errors symmetrical to ones I would have made had I not been exposed to a good core curriculum in the humanities and in political philosophy. These are the errors of believing that political decisions can be made in the absence of clear observations; that facts can be dispensed with if they are discomfiting; that irrational certainties can be used as reliable indicators of proper action. To avoid propagating these errors, science teachers must learn what science is. They must learn how it is practiced, and they must learn how it connects to the large, unanswerable questions that are central to general education.

The question for us today, then, is, "How can we make sure that general education includes (in Richard Feynman's words) a 'satisfactory philosophy of ignorance'?" It is possible, I think, but it requires opening three doors:

- the cultural barrier of a general fear of and antipathy toward science in our society
- the political barrier of a misuse of general education
- the academic barrier of resistance to change on the parts of many college and university science departments.

The cultural obstruction to science entering general education properly has to do with the way science is seen by the general public. According to too many news magazines, TV documentaries, soap operas, and movies, scientists pursue magic powers as white-coated practitioners of pagan religion. They obey only their own arcane rules and then only to be first to uncover some mystery of the universe that would better be kept hidden. Since these discoveries sometimes do lead to new products of great—if sometimes morally ambivalent—value, however, the general public cannot totally disregard their efforts. Public interest in science, from this perspective, becomes reduced to a somewhat risky set of deals with a somewhat shady bunch of entrepreneurs.

This pervasive anxiety about science is not baseless. Science and scientists can do incalculable damage. Twice in the first half of this century, the practitioners, methods, and rhetoric of science became part of the myths that were used by cynical regimes with disastrous consequences to millions of people. Seventy years ago, the Soviet Union became trapped in the myth that a science of history with predictive powers required social engineering in every corner of life, no matter how private. Until very recently, scientists there have had to choose between providing support for this myth or banishment and possible death at the hands of their government's internal security services. In the

same period, the great medical and genetics laboratories of Germany contributed essentially to a nationalistic myth of race that led, before its collapse in flames, to the deaths of millions of innocent people whose only crime was their failure to meet carefully quantified, scientifically defined, racial norms.

Are we now, in this country, susceptible to science as myth? Of course we are. For us, it is the myth of invincibility, the myth of an escape from the historical limitations of other cultures, other civilizations, and other times. This myth, born with our country, supports us in our unparalleled power and authority over the resources of this planet. We scientists share some responsibility for the myth of never-ending fixes. We all have an obligation to say so, if only to keep from being scapegoats should this myth about science turn sour.

A second, political block to the introduction of science in general education is the misuse of general education to indoctrinate students instead of teaching them to think. The intellectual abuse sometimes begins with the notion that we are obliged to agree upon the high points of our culture and civilization because together these define us as a nation or a culture. At other times, it begins with the opposing wish: to bring down the edifice of a national culture and replace it with monuments to a set of approved subcultures. In either case, indoctrination follows when lists of books, pieces of art and music, or political tracts and religious credos are assembled and used as sources of facts and ideas that must be learned in one particular way.

Universal matters of life and death rise above particular times and places in world history; they rise above even our own national iconography, important though it may be to all of us. When asking questions is less important than memorizing lists, general education has failed and political correctness of one or another sort has taken its place.

The very same texts and cultural artifacts can be found in general-education programs that encourage questioning as in those that do not. This has led to considerable confusion in the media. The differences show when one examines how the texts and artifacts are used. By the first definition, these are nuggets of information to be memorized. By the second one—correct in my opinion—these are anvils against which each student must bring the hammer of his or her own ideas and expectations to forge an individual set of beliefs and standards, never one either predictable or demanded, in advance, by a course or a professor.

Science belongs with the arts, the humanities, and the social sciences in proper, nondoctrinaire general education: not for the facts it can impart, not for the questions it can answer, but because the work of scientists is a path—I think the best path—into the large questions that define our own American culture. Science springs from the same human impulse as do music and philosophy: the impulse to create order from chaos, to capture a piece of the universe as truth by sheer will and creativity. Precisely because scientists can

change the world for the rest of us, however, as they ask their unanswerable questions, science in general education can and should deal with the same deep, unanswered questions found at the center of the other portions of a proper general-education curriculum.

The third obstacle to science in general education is neither political nor cultural: it is the purely academic resistance to general education, as such, in many science departments.

The essential properties of the science component of a solid general-education curriculum are that it should be interdepartmental, or more properly transdepartmental; that it should be taught by practitioners of science; and that it should offer students an opportunity to debate and discuss the philosophical, historical, and methodological contexts of current research. The current structure of university science departments makes each of these criteria hard to achieve and harder to maintain.

Interdepartmental courses never will be easy to organize or sustain so long as salaries, promotions, office space, lab space, and teaching assignments all flow to a faculty member from the chair of his or her department. The nation-states of religion, classics, English, comparative literature, and languages have been able to agree on a common market of the humanities. The kingdoms of economics, history, political science, and the like have had the political maturity to band together for their common good. The departments of physics, chemistry, biology, psychology, astronomy, mathematics, and computer sciences, however, are each a separate and sufficient world to their separate faculties.

Few science departments anywhere are quite ready to acknowledge their membership in even a loose academic federation of science. As a chemist once said to me, "I don't teach science, I teach chemistry." He did: brilliantly, but irrelevantly to the hundreds of college students who, fearing and loathing the way chemistry has to be taught to chemists, never had the chance to meet and hear him.

The moat around each science department cannot easily be crossed by student, professor, or dean. It is a permanent physical high tide held in place by the full moon of government funding. That makes a science professor's life incrementally easier than it otherwise would be. Given these facts of life, no one should be surprised that scientists have organized life on their departmental islands to keep up the tidal flow of outside research grants. Steeped in the ethos of peer-reviewed granting, researching, promoting, and hiring, many regard themselves first and foremost as citizens of their department and as citizens of their college or university only when convenient.

As a direct result of this enlightened self-interest, interdepartmental general-education curriculum concerns rarely get proper attention. Scientists look perplexed when a well-meaning colleague or dean asks them to put some extra time and effort into general education. It brings them no grants, adds not a bit to their research capability,

and requires them to teach outside their expertise to students who—by definition—never will become their intellectual offspring. Scientists enter such discussions open-minded but puzzled. They become amused. Then they bring the conversation to a close by getting back to their real work.

Here are some suggestions on how we may begin to establish a proper place for science in the general-education curriculum.

As an antidote to the first, cultural barrier, nothing beats going public. Scientists must take the time to explain themselves to taxpayers—who, after all, support their research. This symposium is a good start. Campuses large and small share one useful property: they have good places to hold public talks and demonstrations, discussions, and debates about science and public policy. Those that already are doing this should do more. Those that do none should begin.

With regard to the second, political barrier of misplaced enthusiasm for a doctrinaire variant of general education, my suggestion is equally simple. This barrier is made by our colleagues, and we should be able to take it down through the example of principled discourse. We must stand up and be counted at departmental and faculty meetings. We must insist on the primacy of free-thinking, nonideological, nonformulaic discourse and the centrality of respect for ideas different from our own. We also must be more humane, acknowledging the links between our work and our beliefs, between our work and our feelings, and—most important—between our work and our fears.

The third, academic obstacle also can be overcome by an investment of our time, but some start-up money will be needed here as well. Scientists active in their laboratories cannot be asked to create and maintain such interdepartmental enterprises out of goodwill alone. The leaders of our colleges and universities must articulate a vision of the university that includes at its center a commitment to general education and back that vision with reasonable resources.

The in-house leadership we deserve—when we get it—will have to be backed in turn by leadership from our colleagues in the federal research establishment. About ten thousand new research grants are issued each year. If one in ten professors getting a new grant also could receive a summer supplement of a month's salary for general-education purposes, the additional cost would be about ten million dollars a year. This is one-tenth of one percent of the current research grants budgets at NIH and NSF—or one volley's worth of Patriot missiles.

I have one last thought, about political correctness. We all have heard a great deal about the rise of political correctness from the left, but we do not hear so much about an older problem: political correctness from the right. It is equally wrong to assume, privately or publicly, that the building of our civilization is (for the want of a better phrase) the white man's burden. In terms of who does science, political correctness from the right

sees everyone in a proper place in the social order, and it sees no problem with a society in which scientists are greatly and disproportionately male and white.

Science should have no racial, gender, or religious component. It should be equally available to youngsters of all backgrounds. The fact is, however, that it is not. White male science professors have far too few African American, Asian American, Latin American, and female colleagues. We should accept our obligation to move over and make room at the bench for these fellow citizens.

General education in science is the one obvious but largely untested way to show youngsters of this country that science, in fact, is open to people of all backgrounds. For that reason alone it deserves to be at the very center of college and university curricula.

PANEL DISCUSSION

GENERAL EDUCATION IN MATHEMATICS AND THE SCIENCES

Moderator: Daniel Schorr
Panelists: David Billington; Stuart Bondurant; Joan Girgus; Shirley Malcom; James Powell; Robert Watson

DANIEL SCHORR: It would have been inconceivable to a student, a half-century ago, that anybody would fight about whether you should get a general education, whether you should avoid becoming—early in your lifetime—so overspecialized that you don't know what the rest of the world is doing.

When I came here, my first question to those who had organized this conference was, "What's all the shooting about?" Why is it a problem to promote general education? Isn't that what education is in the business of doing?

I'm aware that everything has become a source of polarization and controversy—so why not college curricula, too? I guess the fight over the curriculum reflects the polarization, the sense of controversy, that pervades our life.

DAVID BILLINGTON: What *is* all the shooting about? I think it is, first, about the fragmentation that exists in higher education, where we treat everything as a series of specialties. We live in a technological world, and as far as education and the integration of education—which I take to be the role of general education—go, the thing is to remember that the students and the faculty are living in this world of technology. Recall that it is embedded in the *natural* world, the world of science and formulas and numbers; it is organized by a *social* world, a world of cultures and histories and values; and it is interpreted by an *inner* world, a world of poets and painters and critics.

One important way to unify that seemingly dispersed world is to recognize the four great ideas in technology: the ideas of structure, the bridge and the tower; of machines, the car and the plane; of networks, the power grid and the computer; and of processes, the refinery and the assembly line. All of those great aspects of our modern world must be interpreted and brought to education in a unified way by seeing them from three perspectives: the scientific perspective, the social perspective, and the perspective of the humanities.

STUART BONDURANT: One of the reasons that general education in science is not well done may be that many of our professions—medicine notable among them—have developed specializations in ways that are antithetical to the principle of a general education. We have the problem within our professional schools themselves. We've discovered that our education of the general physician is not adequate, and we are groping with some of the same kinds of structural and content problems that will be discussed here.

Most medical schools in the country are developing problem-based learning, in

which nonspecialists are required to deal with problems outside their areas of special competence. Having done this myself, I can tell you that it's an invigorating experience. One of the greatest academic experiences a student can have is to learn in concert with the professor. And we learn—and students learn with us—under these circumstances, when we're in areas beyond our own special competence, functioning as generalists.

JOAN GIRGUS: I want to begin with students as they come to us in their freshman year. If you ask first-year students what they plan to major in, very often they don't have a particular subject in mind. They divide: Either they're going to major in a humanities or social science subject, or they're going to major in a science subject or in mathematics.

If you then ask them what courses they expect to take while they're undergraduates, you get very different answers from these two groups. Those who plan to major in science and mathematics tell you how much they look forward to taking humanities and social science courses as well as science and mathematics courses. The social sciences and humanities students, on the other hand, tell you they're going to take humanities and social sciences courses and as few science and mathematics courses as they can possibly get away with—whatever is absolutely required for their degrees, and not more. Look at the transcripts of graduating seniors, and you see that is what they do.

What are the implications of this for general education in science and math? First, this pattern suggests that the majority of our students are going to take only the number or the particular courses in science and mathematics that they are required to take. Usually, that means that undergraduates in liberal arts programs are going to take no more than two, three, or at the very most four courses in science and mathematics. So we have to decide what our goals are going to be for student learning in science and mathematics and how we can accomplish those goals within a very tight course frame—two or three courses.

A few additional words, about women and minority students: It is painfully obvious to all of us that women and minority students are underrepresented in the ranks of scientists and mathematicians. I don't think that we can use general-education courses in science and mathematics to attract more women and minority students to become scientists and mathematicians in very large numbers because we haven't found any way to increase the pool dramatically once students enter college. I do think, however, that we can use those courses to persuade students—and this includes most women and minority students—that science and mathematics are interesting and important, that they are doable by everyone, and that they connect to the larger questions that affect everybody's life.

I think that if we can do that, we will have parents and citizens who will make better decisions and pass on to the next generation of women and minority students the

notion that women and minority students find science and mathematics interesting, important, doable, and connected to important questions in their lives. Then, maybe in the next generation we will begin to see the underrepresentation really turn around.

DANIEL SCHORR: Is there something in the atmosphere or the economy that militates against broader education, simply because students are so focused on getting those credits, getting that degree, and getting out there to make a living?

JOAN GIRGUS: Yes, I think there is. The irony, of course, is that the students I have focused on in my comments are the other group. They are students who by and large are committed to liberal arts degrees in the humanities and social sciences, who think of themselves as students who want to be broadly and liberally educated. In fact, though, they don't see science and mathematics as part of that broader liberal education.

That's really the task that we have in front of us in general education in science and mathematics: to show them that it is and that they really have only half of their education in hand. Yet because of the way our curricula are structured, the number of courses we have to do that is very small.

SHIRLEY MALCOM: We need to educate teachers so that they don't perpetuate the problems we have now in the schooling of children. They must pass on this value: that science and mathematics are important and part of this larger notion of what it means to be an educated person.

A couple of years ago, I met with the special assistant for education to one of our nation's governors and remarked to her about her own background in the sciences. She told me that to get certification to teach she had to take one course in the physical sciences and one in the biological sciences. She ended up taking the nonmajors' courses: one in astronomy and one in entomology. So her knowledge of science is confined to stars and insects. I asked her why, and she said, "What alternative did I have? Within my institution, there was no course or set of courses that would allow me to come out with a set of understandings, either about the physical sciences or the biological sciences." She chose to do depth rather than survey courses, but depth did not give her the essence of what it meant to do science.

JAMES POWELL: A lot of what we're talking about this morning in science education can be approached from a commonsensical point of view, focusing on a couple of undeniable facts. One is that science is interesting, fun, and even exciting to a lot of people. If you don't believe that, go into any science museum and just stand around for thirty minutes; you will see little kids—black kids, girls, you won't notice any racial or gender differences—with their eyes popping out of their heads as they start to learn about science.

But by the time they get to college, somehow we've allowed that excitement to get away, and we haven't done very well at restoring it. We know what works in science

education, at all levels, but somehow we've allowed the system to defeat our knowledge of what works. We know that the way to teach people science—or to have them learn science, to put it more appropriately—is to have a hands-on, active involvement.

We have to treat students as active communities of learners in small groups, ideally, where they're encouraged to work collaboratively—and then not penalize them by accusing them of cheating when the course is over.

We have to promote and reward faculty members—and we have many of them on our campuses—who are deeply committed to teaching: people who see themselves as teachers first, not as chemists or geologists first. We have to encourage people who see the failure of students in their courses as their own failures, in part—people who will do more than simply blame it on the high school or on students' race or sex.

Of course, those of us at the senior level in institutions—and historically the National Science Foundation—have not rewarded teaching; rather, we've tended to deprecate it and reward people who do research. Now we're reaping the results of that.

ROBERT WATSON: I want to focus on the question you raised about whether or not things are worse than they were in the past. I think that they are. I would like to focus on general education—freshman or introductory courses—just for a moment because that level sometimes is neglected.

The data tell us that if we look at all the students coming through school systems in this country, a certain set make it through high school having taken science and mathematics, having done well, and having said upon graduation, "I'm going to go on and I'm going to become a scientist or an engineer." The data show that a year later, 40 percent of those students have fallen out of the pipeline. There are a lot of reasons, not all of them being the quality of teaching at the freshman level.

One can conclude, however, that something significant is happening at the freshman level in college. For example, we know that certain courses are great weeder-outers of students; one is freshman chemistry. I taught freshman chemistry a number of years ago and I know, as a member of the chemistry community, that freshman chemistry—particularly freshman chemistry laboratory—probably hasn't proselytized too many students into science over the years.

SHIRLEY MALCOM: I'd like to pick up on Bob Watson's comment on freshman chemistry making no converts for science. I think it's worse than that. In this particular case, there has been a process of selecting people out. People behave differently in a system that keeps them in than in one that selects them out. What we have put in place is a series of hurdles designed for triage. Social Darwinism? I don't know what to call it, but we take people with very good grades, with good preparation, and we put them through a bunch of gates that raise the threshold again and then grade on a curve. We have to recognize that what we're doing is selecting—weeding out.

ROBERT WATSON: I'd agree at least partly with Shirley. There has been a tradition of thinking that the job is to weed out rather than to nurture. But there are good signs. There is a great concern on the part of the professoriat nationally about that attitude. The mathematics community, for example, is paying a lot of attention to the undergraduate calculus course. This has probably been the biggest weeder-outer of all, and the byword in the mathematics community now is to make calculus a pump rather than a filter.

JOAN GIRGUS: One of the things lurking in the corners of what we're saying is whether we think that general introductory courses in disciplines—courses we use to prepare majors in science and mathematics—serve well as general-education courses. I don't think they do. Whether they're filters or pumps: those are important questions, but they are questions for potential science majors. When you're talking about general education, I would argue, you are talking—at least in terms of numbers of students—largely about majors in other fields. That's why I emphasize the notion of what we are going to do in a two- or three-course frame, because that's the frame that we're working with in this context.

We have to decide what our goals are. We have to teach students to understand how scientists and mathematicians think about problems. Deeper understanding results from doing science, rather than hearing about it. Students need to understand quantification and hypothesis testing, something about probability, the crucial role of evidence gathering and what can go wrong with that, the idea of alternative explanations and how they're used. We need to think about what the goals are; then we have to go back and construct our science courses around them.

DANIEL SCHORR: I happened to be in Moscow in 1957, when the first two Sputniks were launched. There was a sort of panic in this country, because we were not able then to put a satellite into orbit. With the impetus of that kind of little panic, we got the National Defense Education Act. The question is, minus some great impulse like fear of some superpower or something, what motivates us to accomplish the results you're trying to get?

JAMES POWELL: Every time we turn on our CD or our TV or start our automobile, it's apt to be made in some other country, but we're not going to have that one explosive event that is going to galvanize our attention. What we need in place of that is leadership. We have a president who aspires to be the education president. We had a person who had strong educational interests in Erich Bloch, the former director of NSF, and now we have one—Walter Massey—about whom one could say the same thing. So some of our top national leaders see themselves as educators.

We also need leadership from college presidents and deans and some of the people who are here, but ultimately this has to get down to faculty members, the people in this

audience. They have to believe that there's a problem, that they can be part of the solution, and then vote with their feet and get on with it.

SHIRLEY MALCOM: I worry very much about the science major's general education in science. We have specialization much too early, and I worry about the overall sense of science. I think it is possible—and I have actually seen it—for students to get to their junior and senior years knowing the sound bites but not the story. They play the notes, but they don't hear the music. That really is something that we have to worry about.

DANIEL SCHORR: Let's hear what others have to say.

RICHARD RICE [University of Tennessee–Chattanooga]: I don't know how many times I have heard a speaker introducing somebody from science and admitting—as I have done myself—"I couldn't balance my own checkbook." It always gets a big laugh from the audience. I can't imagine an individual saying, "I couldn't write a complete sentence." We accept a degree of illiteracy in science that we wouldn't in any other area.

Another factor, perhaps, is the failures of science and technology. You all know about those. I am wondering if a lot of our students now no longer see science as we did in, say, the late 1950s: as a way to save the nation.

STUART BONDURANT: Add to the litany of things that have degraded science in the popular mind recently misconduct in scientific research. In the eyes of many young people, scientific fraud has made science and scientists look less exciting and attractive than they were to previous generations of young people. I would suggest that at the undergraduate level, serious and scholarly consideration of the ethics of science may help to address this problem.

SHIRLEY MALCOM: This issue of our goals in general education in science is something we must return to. What is it about science that we want people to take into their adult lives, no matter what they are going to do or be? How many shots do we have at it?

For the vast majority of people, high school is it. For another fraction of people, we get some into college and offer them something that we call a general-education course in science.

That particular slice of the population is likely to be most of the same slice that will be in Congress, on our school boards, our judges, probably our president, our vice president, our state legislators, and a good percentage of the people who probably are our accountants—or what have you—who do these other things for us in our lives. And the folks who vote. What do we want them to know about science? What do we want them to believe about science? What values about science do we want them to take to the polls? Or to the bench? Or into the jury box? Unless we become very clear about what those values are, we are not going to get it right.

JOAN GIRGUS: I would just like to suggest that I don't think we believe enough in our students. And I don't think they believe enough in themselves, particularly when it come to science and math. In Japan there is an assumption that everyone can do science and mathematics—and that if you get stuck and it gets hard, you work hard, you figure out a way, and you plunge forward. It's the kind of assumption we tend to make in the social sciences and humanities.

It goes back to saying, "I can't balance my checkbook" but not daring to say, "I can't write a sentence," because everybody can write a sentence. Well, everybody can do math and science, but we don't believe it and our students don't believe it. We've got to come to believe it, and we have got to persuade them that it is true.

JAMES REDFIELD
"BUT 'TWILL SERVE"

My remarks are about how we might change our minds—something that is perhaps harder than what Bob Pollack has recommended, although more obviously within our power, paradoxically.

Daniel Schorr pointed out that we've become increasingly polarized in America. This is a curious transformation, and I am not sure that we are entirely adjusted to it. One of its aspects is that everything becomes political, and the question is always asked: "Are you a man of the Right, or a person of the Left?" In this, as in so many other kinds of classification, I persistently have difficulty with myself. I would declare myself a loyal alumnus of that famous pinko University of Chicago College of the 1950s.

On the other hand, I have some difficulty with the kind of curricular planning that seems intended to produce a balanced ticket. You take a great book, and then you take a mediocre book, and some of this and some of that, because the notion is "spread," "coverage," and "representation." This seems to suggest that you *can* judge a book by its cover, that the most important thing about any work or any text is the group to which the author belongs. I find this a dubious proposition.

Some years ago, after I heard a certain humanities program described, the very first comment was, "You don't have any women authors"—to which somebody then said, "Well, you've got the *Odyssey*." That really is an interesting point, because it has been held—not implausibly—that the *Odyssey* was written by a woman. My question is: If it should turn out that the *Odyssey* was written by a woman, how would the book be transformed for us?

It often is asserted—and there may be some truth to this—that works arising from certain groups and sources can be helpful in the educational process because they teach tolerance and break down stereotypes. What makes me doubtful about this is my experience last year of teaching Joyce's *Ulysses*. It was a great experience, but it did not make me love the Irish. It is a highly stereotypical book: You come away from *Ulysses* with the sense that the Irish are a bunch of loquacious drunks who do not pay their debts.

Once you notice these facts about *Ulysses*, you might be tempted to think perhaps it ought to be banned here, too. In other words, if the point of reading these books is to teach tolerance and break down stereotypes, we had better check them out one by one and make sure they really are doing that job. That brings us back to a recurrent point: Once you start evaluating your education on the basis of its political effects, you are on a slippery slope.

We tend to believe that "if you are not part of the solution, you are part of the problem." There are moments of crisis at which this is true. More generally in life, though, if you are not part of the problem, you are part of the solution. People who are

continuing to live—even, perhaps, displaying examples of virtue and happiness in so doing—are the people who, in their own way, keep a society going. This is a positive social act.

Keeping a civilization going is a little bit like trying to maintain the Amazon rain forest

Americans are very restless people. We believe in change. We also are a very guilty people. We tend to believe that everything we have done must be very bad, and if we don't do something about it—or at least make some very strong symbolic action that will disassociate us from it—we will be responsible for all the bad things that are going on.

In the classroom, however, you become increasingly aware that the primary work of the educator is highly conservative. It has to do with the mortality of man. Walking across campus a few years ago, I saw the flag at half mast, and I had an epiphany: the problem with education is that full professors are constantly dying, and no full professors are ever born.

The problem is renewing the capital stock: just trying to keep this thing going when all this knowledge and skill constantly is dying off and has to be gradually, slowly, and painstakingly recultivated. Most of education, most of the time, has to be about that. Keeping a civilization going is a little bit like trying to maintain the Amazon rain forest. Civilization is under constant attack of that kind.

On the other hand, I am not really happy with the people who have raised the banner of Western civilization and somehow managed to turn that into an ethnicity, like something cultivated in church basements. "We are the Western, the Western civilized," they say. Consider Saul Bellow's oft-quoted remark: "When the Zulu produce a Tolstoy, we will read him." The only really unforgivable word in that sentence is "we." You want to say, "What do you mean 'we,' white man?" There is a real question as to who owns these books. We native Americans already are having trouble with Tolstoy.

This can be explored in both directions. The Igbo already have produced a novelist who—in my opinion—is in the category of Bellow, and I think Bellow probably reads him. I think I often feel closer to Achebe than I do to Tolstoy.

In fact, if you have tried to teach, say, *Antony and Cleopatra*, you know how exotic that text is, how strange a world it represents, and how much of a stretch of mind it requires to get to it. That's diversity—a kind of diversity.

These two camps actually have a lot in common, which usually turns out to be the case when you find people raising their voices. In their extreme forms, they are two groups of people who really like to talk about books but not to read them.

The way these people talk about books does not seem to reflect much experience of reading books. It's very strange, for instance, to assert that if everybody read Plato's

Republic we would have a greater degree of social consensus. In fact, you get social consensus not out of Plato's *Republic* but only out of some approved interpretation of it—which, I am sorry to say, often is the subtext in these kinds of claims.

The other thing these two groups have in common is that they vastly overrate the effect of formal education on the political scene. The laboratory for that problem, it seems to me, is Eastern Europe, where a political movement had control of the entire educational system for forty years. The impact on the populace was minimal: When the lid came off, everybody seemed to be just about where they had been forty years previously. Think about that the next time you are trying to cultivate values in your students.

Educators have a unique place in American society—as education has a unique place in our society—because our society is inherently relativistic. We do have a tradition: of not being as traditional as other societies; of allowing what the American way of life is—what American culture is—to be shaped and reshaped primarily by the waves of immigrants arriving here. We now are in the middle of the largest wave in our history, and we are doing very well. It's amazing: the degree to which Americans have this capacity to integrate and reintegrate, reform, and create a new rough-and-ready pluralistic consensus around whatever kinds of groups have shown up.

There is a lot of stress, however, and a lot of this stress is reflected in our anxiety about education. This reflects the fact that we understand that these values are created somehow. They are not inherent. We know that the way we are is conditioned historically; it is acquired. None of us was born with it. We work it out with each other as we go along through this unfolding history.

In other words, we know that *what we are is acquired by education*: It is an educational product. We then apply this knowledge rather illegitimately to the institutions we have formed to organize this process, even though the Eastern European case demonstrates that institutions of formal education are the least of it and that a culture can be quite immune to formal education.

Because these institutions are part of the cultural process, they do not provide a service for sale. It is true that education has value, but it also transforms values. There is a logical contradiction in trying to sell somebody new values because the act of selling requires offering something they value already.

The real social problem of education, and the reason it is not a service, is that it is like justice. Consider the question: Is my being just something I should care about? Is it of value to me? The answer to that question, I think, is yes—but it is a difficult question, and it takes Plato ten books of the *Republic* to come up, tentatively, with a positive answer to it. It is absolutely unquestionable, however, that my being just is of advantage to other people and that their being just is to my advantage. Therefore, I have every reason to try to see to it that you people are just, fair, truthful and so forth.

Education is like that. There may be a question as to whether my education is of value to me, but there is no doubt that other people's education is of value to me.

This is why education is compulsory and why we have requirements. The schoolboy who creeps like a snail unwillingly to school is replaced by the undergraduate who is getting his requirements out of the way. This is why education is heavily subsidized at every level—through tax funds, tax breaks, and all kinds of other devices. This is why we work so hard to see to it that education is rewarded: because we need it. This, by the way, is the real origin of the vocationalism of which we complain so much. We need others to be educated, so we keep telling them that education is going to do valuable things for them out in the world—that they are going to get paid back for it. Then we are surprised when they ask, "What is the least I can do in order to get paid back in this way?" Yet that is very rational; it is, so to speak, the labor theory of education. They are trying to minimize their disutilities by getting educated to the least degree that will offer them the rewards.

We also know this really is the opposite of education. This is the puzzle, the inner paradox. It has a social correlate in people who see education as a means of social control, which also is the opposite of education.

The real paradox lies in the fact that I have an interest in the freedom—that is to say, the independence—of others. I have an interest in not being able to control their ways of thinking and acting. This is the inner paradox of a civilized society. The *Republic* also is about the fact that most people prefer power to happiness. Education really is about happiness, but we talk about it as if it were about power.

As you can see, my real subject here is "a plague on both your houses." I took my title, however, from elsewhere in Mercutio's speech: "'Tis not so deep as a well, nor so wide as a church door, but 'tis enough; 'twill serve" (*Romeo and Juliet* III,i,90). Mercutio, of course, is speaking here of his mortal wound, but I hope to give a more positive spin to this quotation.

The question I'm sure you are waiting for me to answer is: What does all this have to do with the curriculum? The curriculum needs to be discussed. This is a very obvious point. The fact is, however, that most of us are not in the education business, and we really don't like to think about education.

Almost all of us say we love to teach, but I think that if we really wanted to teach—if we really wanted to make a difference to people in their development—we would have become schoolteachers. The opportunities to teach really are much greater at the school level. You tend to have smaller groups of students. You work with them more closely. You work with them through the year, and you really have a chance to make a difference. I think many more lives have been changed by high school teachers than by college teachers, and probably even more than that by elementary school teachers.

The fact is, most of us relate to our fields. That is what gives us our identities, and the American university is set up this way. Therefore, we do need to discuss the curriculum, but we need to discuss it by thinking about students—what their needs are and what can make a difference to them. We should not use the curriculum so much as a kind of battleground for our symbolic representations of ourselves to ourselves. Try to think about what these kids need and what will help them.

A good education involves a variety of experiences. In my own college education, I would distinguish at least two very different kinds of experiences. One was the sense of being in contact with tradition—which certainly seemed to us to be sacred: These were the great books. We associated our curriculum with Hutchins, but we didn't think he had written it; we thought he had *received* it some place. There was another aspect to this curriculum, however—in those days mostly represented through the social sciences—which was the demystification aspect: the part where you feel grown up because they take you around to the back and show you how it works. This was studying Freud and Marx. This was where you saw through things, and you became very hip. We need both of these contrasting experiences.

We need to recover some sense of education as good in itself, something we care about for ourselves: that is to say, a form of happiness. This is a peculiarly American problem because of the peculiar way Americans organize the sequence of education experience. For some reason, we have made a collective choice that we are going to send our kids through university while they are still in school. That gives us this funny effect that there is two years' worth that really is schooling—which we nevertheless ought to be providing even though we are academics, college and university people. This produces the recurrent tension between teaching and research, which is the stuff of life for us.

This tension is at the center of our system. The challenge of general education really is resolving our double identities—as academics and schoolteachers—because we have been commissioned to be both. I happen to think that is very good for us.

Where you find that human meaning—where you find knowledge as a source of happiness—you have something that is teachable in the serious sense, not in the sense of a saleable service but in the sense of membership in a community. This is teaching as a form of friendship, a communal relation. In order to find that, however, we have to find it in ourselves. That is what the problem of liberal education in the curriculum is all about.

PANEL DISCUSSION
GENERAL EDUCATION IN HISTORY AND CULTURE

Moderator: Daniel Schorr
Panelists: Peter Benoliel; Carlos Cortés; Thadious Davis; Russell Edgerton; Ellen Harris; Ernest May

PETER BENOLIEL: Education at its best—as opposed to training in skill sets, which are indeed very important—takes place in smaller groups, involves teachers as learners (read faculty), and learners as teachers (read students). A significant part of the curriculum should be common for all students and—we hope—much of the faculty. This kind of thing can enhance the educational process, promote dialogue between and among students and faculty, and enable a community of learning, excitement, and—most importantly—shared experience.

A student investing four years and considerable financial resources in an undergraduate course of studies deserves more than training in skill sets or a smorgasbord where choice generally is governed by convenience or ephemeral, transitory considerations. It should not be surprising, then, if you find me a firm advocate of liberal learning embodied in a fixed or core curriculum. Put another way, those making an investment in undergraduate programs are best served by a liberal education that provides a context and relevance that enables students to ask meaningful questions, assimilate new knowledge, plan and implement their own intellectual and action agendas, and go on learning for a lifetime.

DANIEL SCHORR: What you say is motherhood and apple pie. But in practice there are trade-offs to make. The question is, "What priorities?"

PETER BENOLIEL: I would submit that a trade-off is not needed. To be a good scientist or a good anything, one is best served by having a balanced exposure. Therefore, the student shouldn't think he or she can take another course in chemistry and not a course in (let's say) ancient philosophy. Both should be given equal importance.

CARLOS CORTÉS: I start with a quote from Alvin Toffler, the futurist, who says that all education springs from some image of the future. If the image of the future held by a society is grossly inaccurate, its educational system will betray its youth.

I would suggest that two things are absolutely guaranteed in the future. First, our society will become increasingly diverse in ethnic terms; beyond that, persons who have had limited access to institutions in the past will increasingly be involved not only in greater numbers but also in providing new perspectives and voices in those institutions and in asking new kinds of questions. Second is increased global interdependence. Those are two things that you don't have to be much of a futurist to predict.

Nehru once said life is like a game of cards: the hand that is dealt you is determinism; the way you play it is free will. Greater ethnic diversity and global interdependence are two determinisms that we face. The issue for schools is how we deal with these deter-

minisms in terms of our own free will. I would argue that one of the main goals of general education in the decades to come should be to address the issue of what diversity means in our society and what global interdependence means for our nation and the world.

In terms of diversity, the challenge is balancing the imperatives of *pluribus* against the imperatives of *unum*. That is not new in our society. We have done that since our nation's beginnings, but growing ethnic diversity has added greater complexity to the *pluribus-unum* balance. With regard to global interdependence, the issue is balancing imperatives such as patriotism and pride against the dangers of national provincialism and ethnocentrism. I don't think we are doing a good enough job in schools in helping students learn to address the challenges of ethnic diversity and global interdependence.

The best way to assess the success or failure of higher education is to examine what kind of remedial education college graduates need. I do a lot of work with kindergarten through twelfth-grade teachers. There are three things teachers constantly ask for that they didn't get in college. They don't know enough about working with students of diverse backgrounds. They don't know enough about diversity and American culture. And they aren't sure how to teach about the globe. Should they teach that all cultures are essentially equal? How should they approach the comparative teaching about cultures? They don't learn these things in college.

I also work with private business, and I constantly encounter similar examples of the need for remedial education. Business executives say schools didn't prepare them to deal with the world of diversity, and they weren't prepared in our business schools to deal with global interdependence.

The issue is not information, and it is not just knowledge. The challenge to colleges and universities is to help students develop the wisdom that enables them to address the kind of ethnic and global future that we know is coming.

THADIOUS DAVIS: Four points are significant in this context. One is access. That probably is one of the most important issues now, because it addresses notions of democracy, of class, gender, and socioeconomic condition. I want to remind all of us, however, that in the aftermath of World War II and the GI Bill, American academies changed dramatically because there was an influx of different kinds of individuals into the colleges and ultimately into the teaching profession.

The second issue I want to mention is diversity: in terms of gender, race and class, and ethnicity but also in terms of models of inquiry and ways of understanding how the life of the mind functions, how it lives, how it grows, and how it develops.

The third issue is relevancy. Someone mentioned the representation of self. In curricular matters, the representation of self is significant in the models that are taught in the classroom and in terms of institutional self-representation. What is this institution as a self? How does it relate to a whole series of other, comparable institutions?

Finally, there is the matter of development, or change and transformation. Development and transformation includes understanding how canons change, how the curriculum changes, how content changes, and how—importantly—interpretations change. I think interpretation may be the key to the kinds of changes and transformations that are going on now.

There are two problems with how we think about colleges and universities. On the one hand, colleges and universities are supposed to produce or provide a labor force. On the other hand, colleges and universities are supposed to provide the ground on which students—and faculty members as well—can develop mental processes, ways of thinking about self and the world, and place and positioning in the world.

Now, those are two very different ideologies. Some institutions function very well looking at themselves as places that provide a work force. Others look at themselves very well as institutions that provide a liberal education for the enlightened individual. I don't think the two things are mutually exclusive, but I do think they are very different. And I don't think they necessarily function in tandem.

RUSSELL EDGERTON: I think the political and public debate about general education is fixated on a narrow, superficial set of issues: primarily the content of particular courses. It is not a trivial issue whether Stanford students study Alice Walker or Dante in History of Civilization, but from an educational perspective those sets of issues are medium or small potatoes in terms of the total agenda.

Carlos described the kind of world that we are moving into: complexity and interdependence, rapid change, and so on. I would add that there also is a reconfiguration of who is doing the educating in society, where families are losing their grip. And the mass media have an enormously powerful influence.

The choice for colleges and universities within that reconfigured society is not unlike the same choice that parents make about their families. Are we just going to ride along with the currents of society? Or are we going to stand for something and try to turn out the kind of people who will shape society in the kind of vision that we want?

I would hope that we all would choose the latter. It seems to me that colleges have a kind of thermostatic function. This is not necessarily a conserving function or a liberal function. The role of the college is to put forward those things that other institutions in society are not putting forward. When society is running hot, colleges ought to run cool, and vice versa. When society is caught up in the present, the college ought to remind itself of its past. When society is bound in tradition, the role of colleges and universities is to point to the future.

I would hope that we would all say, "Yes, we want to stand for something." We have internal visions of what we think we are all about. My favorite metaphor for the kind of vision I think it makes sense to organize a general education around is: What

kind of person would you want to teach your child in the fourth grade? That's the concrete ideal we ought to have in mind when we design a general-education program. That is a lot more than a body of knowledge. Abilities are more important than knowledge, and attitudes and dispositions are even more important than abilities in the matrix of outcomes that we need to commit ourselves to produce.

If that is the case, we have to ask ourselves, "How do we do that? How do we turn out people with the abilities and attitudes and curiosity and resourcefulness and flexibility that we think of when we think of that ideal fourth-grade teacher?"

The punch line for me is that how we teach is in large part what we teach. And if we are serious about turning out people with abilities and attitudes, as well as a body of knowledge, we have to fundamentally transform the assembly-line, lecture-based model of education that we have inherited from the nineteenth-century university. We have to commit ourselves to collaborative, problem-focused, case-based experiential modes of teaching and learning on a scale far beyond what we now are offering in our colleges and universities if we are serious about the agenda of general education.

ELLEN HARRIS: I would like to say a few words about the role of the arts in general education. First, one of the things that distinguishes general-education courses in the humanities and social sciences from those in science and the arts is the distinction we tend to draw between learning by thinking and learning through doing. College students who study history or literary criticism are asked to "do" history and literary criticism at a level appropriate to their understanding. General-education courses in science and the arts, on the other hand, tend toward "appreciation" rather than "doing." Thus, we generally ask students to approach the disciplines as observers: to get a bird's eye view, to come away with some ideas of what it's like over in this corner. Except for such "appreciation" courses, many students have no access to these disciplines.

When we talk about general education, therefore, we need to talk about this dichotomy between learning by thinking and learning by doing. There seems to be a perception that if you are thinking you are not "doing" anything, and if you are doing something you are not thinking. Unless we build the thinking and the doing together and join them hand in hand, we will not be serving our students in the best possible way.

In the arts, this "hands-on" approach can be a source of discipline, intensity, and creative thinking—attributes of learning that students frequently are not exposed to in any other way. Very often the students who excel are those who, at a young age, develop self-discipline through hours of practicing or spending time on a project, or discover the rewards that come with immersing themselves in and becoming passionate about something. You cannot take a fourteen-year-old who has never experienced these things and make a scientist out of her—or an architect, or a humanist. The contribution of the arts to the acquisition of these learning attributes is only one reason they are not peripheral

but utterly essential to what we do. And that is true from kindergarten through college.

ERNEST MAY: I want to offer four propositions that I think have some relevance to our debate. The first is that people learn things because they think those things are going to be of some use to them.

The late Samuel Lubell, who was one of the most perceptive students of public opinion, didn't use standard polling techniques. He had contempt for going around with questionnaires and asking people's opinions because, he said, that's not a very reliable index. What you should do is find out what people know: That tells you what their opinions are. If you want to know whether they think the economy is going up or down, don't ask them what they think about that, ask them what their seniority is: If they know, they are worried about their jobs. So the first proposition is that people tend to learn what they see some need to learn.

The second proposition, about which I feel passionately, is that people need to know history—and not just our history and not just very recent history. We need history to understand how to live comfortably. We may even need it to understand how to live at all.

Let me give one quick example from our recent experience in the Gulf War. One feature of the war was the extent to which it deepened the rifts among the rich nations—the United States, the Germans, and the Japanese. There was profound misunderstanding among us: resentment, widely felt in our country, about the slow entry of the Germans and Japanese; profound resentment in Germany and Japan about our having acted without having consulted them and then sending them the bills.

To explain the difference, consider the differences in our histories. For us, the lessons of the 1930s and World War II are in our bones: the lesson that aggression must be stopped at an early point, with a small war, so that large wars don't develop. The Germans and the Japanese, on the other hand, didn't learn that lesson; they were on the other side. The lesson they have taken from that period is that all wars are bad.

Proposition three is that in education, we need to find out what students need, not just—as we tend to do in this debate—assert that they need the classics or assert that they need a more diverse literature or whatever without really probing. We need to find out not just what they need—and what they sense they need—right now, but what they may think they need ten years, twenty years, thirty years from now that they can bring to bear on problems.

Fourth proposition: The best way of getting students to identify what their needs are is to add to their experience side, to get them to play the parts that they may play in life, or that they can imagine themselves playing in life: making decisions, trying to think about choices so that they realize what they need to know in order to weigh issues.

To refer again to the Gulf War: If you get students to imagine that they have some

responsibility for deciding what the United States should be doing, they realize they need to know something about Islam; about the Crusades; about long-ago, far-away history.

PETER BENOLIEL: While I agree that we tend to view the university or the college experience as training or preparing a work force, on one side, and on the other as the more traditional liberal education, I think we sell both short by preserving that dichotomy.

Technology is changing so quickly that people who are trained in a discipline today cannot be prepared for the disciplines of tomorrow. But if someone is truly liberally educated in the more traditional sense, one is better prepared to learn the changing technologies. The challenge is not how to preserve the dichotomy but how to bring the two aims together.

RUSSELL EDGERTON: Are we organizing our interests around the right metaphor? What do we mean by core? Is core a foundation? Or something else? In the nineteenth century we learned to build buildings not by developing a base but by building a scaffolding and then working to put the stuff inside the scaffolding.

It seems to me that if we would think about general education not as base or foundation but as scaffolding, we can challenge a lot of the nonsense about prerequisites and introductory survey courses and all these things that don't make sense.

GALEN PLETCHER [Southern Illinois University–Edwardsville]: I would like to direct a comment to Ellen Harris. I was struck by the similarity, from the general-education point of view, of the way science and music are taught. The problem, in both cases, is that there isn't sufficient involvement with the subject matter. And the reasons are quite similar: The faculty claim that there are not sufficient faculty to do this—one on one, as it would be in music, and in small laboratory sessions, as it would be in science. There isn't sufficient equipment. Although I don't mean to be uncharitable, I think that there also may not be sufficient patience to deal with people who are starting at a very elementary level.

In fact, we have had real problems convincing science teachers to use any kind of hands-on procedures with students who are not science majors. They tend, I think, to think poorly of the courses that are taught for nonscience majors in perhaps the same way that a music person might think about music appreciation: that it is something that they have to teach before they can get back to "the real stuff."

ELLEN HARRIS: I want to say something that might raise the ire of my colleagues here. My sense is that core programs have been based specifically on history and culture, so that when any other subject—whether science or the arts—becomes part of a core requirement, it is asked to model itself on these history and culture programs. This is why the arts and sciences are now being taught in most general-education programs as the "history and culture" of art and science. The irony is that by trying to look like the his-

tory and culture core, science and art are not taught as disciplines in which you would want to immerse yourself.

BOB BENEDETTI [University of the Pacific]: I want to ask Russ Edgerton to speak a bit more about the distinction between core and scaffold.

RUSSELL EDGERTON: We can think of the general-education agenda as winding through the years and not automatically assume—as we sometimes do—that a bunch of courses are foundations for other courses. And we should look harder at the concept of what we mean by basic foundations, especially in the social sciences—which have modeled some of their notions of prerequisites on the natural sciences. I can say with some confidence: It is nonsense that you have to take political science 101 before you can take political science 404.

Contained in this metaphor of scaffolding is the notion that the real agenda is abilities and attitudes, not simply bodies of knowledge.

SHEILA TOBIAS

DISCIPLINARY CULTURE AND GENERAL EDUCATION: WHAT CAN WE LEARN FROM OUR LEARNERS?

Why do so many of our students see general education as just a set of requirements to get out of the way? In other words, where are our students in this equation? What do our students have to teach us about their response to general education?

For some years now, I have been exploring what I call learning behavior on the boundaries of disciplines—namely, the response of otherwise intelligent students, and their stand-ins, to the prevailing discourse of disciplinary instruction. Note that I do not speak of the prevailing discourse of the disciplines. In fact, the way we present our material—particularly in science—and, above all, the way we may measure the student's participation and performance distorts and leaves unexplored the way our discipline actually is practiced: that is, the way we think and work.

As one of my subjects in an experimental situation put it: "This course did not play to my strengths." In comments like these, my subjects are reaching for what should be an underlying theme in any discussion of general education—namely, that there are a variety of disciplinary cultures and that it is particularly harrowing for students to cross from one to the other. As I discovered in my investigation of math anxiety ten or twelve years ago, for anxious and avoidant students of mathematics, math is not simply a subject but a relationship between themselves, the subject, and all the people in that class who are better at it than they.

Such relationships exist across all our disciplines and are influenced by the packaging of our subjects in ways such as the pace of the course, its scope, and the way new material is sequenced. Examinations, their design, their grading system, the degree of competitiveness, and the style of presentation are the aspects of these courses that my subjects speak about most. What this means is that for many students, a general-education course in a discipline other than their own is going to be hard, not because the content actually is too difficult for them to master but because it is packaged and purveyed in unfamiliar ways.

To get a closer look at how subjects are packaged and enculturated, I began to do research in this area. I constructed an experimental design where otherwise accomplished outsiders would be placed in short-term and semester-long introductory courses in a variety of disciplines outside their own fields of study.

The responses from these outsiders confirm my hunch that it is habits of learning, relationships that need to be newly constructed between the learner and the subject, and the packaging of the courses that are highly problematic for these students—not the material, narrowly defined, itself. My conclusion is that students who may be fearful and avoidant of general-education courses—even unsuccessful in their first trial—are not

dumb (as I call it in my latest short book) but different. Their differences are very much worth our attention.

I'm going to give you a few examples of comments made by these outsiders to science, mathematics, and poetry as a way of elaborating on my point.

There are a variety of disciplinary cultures, and it is particularly harrowing for students to cross from one to the other

The first group of comments comes from the work of faculty members studying physics in two experimental situations. In one case at the University of Chicago, a two-day experiment involved a relativity specialist talking first and an experimental physicist second. In each of these situations I invite the teacher to select a topic that will require a stretch for the learners, because I want them to sweat; I want them to experience some of the tension of being outside their comfort zone.

From that first two days of experiment at Chicago a professor wrote in his post-experiment letter to me, "Two things struck me about this mini-course: first, how interesting the material is; but second how, when I did not understand something immediately, my mind locked and I felt helpless." What does helpless mean? It means we don't know what to do to get ourselves out of a bind. If he'd been an undergraduate he might just have felt helpless, perhaps even dropped the course. Being a professor and under my instructions, he stood back and tried to analyze the sources of that helplessness, and he wrote, "It seemed to me during these lectures that I lacked any framework of prior knowledge, experience, or intuition that could have helped me order the information I was receiving." He said, "I had no way of telling what was important and what was not." The key: How can you order something if you can't tell? Nothing coheres.

Later, in Indiana—where we had eleven professors from a variety of nonscience fields study for three weeks a calculus-based course in Newtonian mechanics—at one point our professor asked the class, "Do you understand?" One of our nonscience professors, seated between two undergraduates, was overcome, stood up, made himself very visible, and said, "How do I know if I understand?" He wanted an operational definition of understanding, and he didn't know where to draw it from in this lecture.

This effect—this not knowing what is important and what is not—affects note taking, and scientists tell me they expect students to write down that they do not understand and work on it later, when they go back to the text and when they do their problem sets. This may work for students who are comfortable with this mode, but for students coming from the other side of the campus it doesn't work. In those fields that have a very precise vocabulary that doesn't lend itself easily to translation into spoken English, note taking is going to be, for certain students, a barrier.

When you interview professors, as I do regularly, they will explain that the bigger picture doesn't come into view in science, which is a very vertical subject, until you get there. There is no way of telling students what they will be able to do or understand in

advance. I understand that, and I'm very sympathetic, but I'm here to say to those of you who teach science that there are students out there who need their overview to hang your material on.

Jacki, a creative writing master's candidate, took a semester-long physics course at the University of Arizona. For her the overall effect, as she wrote, was, "This course made me feel like a naive child whose parents tell me one small thing at a time, making everything else seem equally mysterious." The infantilizing experience was very frequently mentioned, even by professors.

Michelle, a graduate student in philosophy taking still another physics course, felt that "the excessive focus on problem solving robbed her"—and, she put in parentheses, "students like her"—of the "opportunity to creatively interact with the matter." Her I.Q., she wrote, was sufficient for physics; her O.Q.—she made this up and explained, her "obedience quotient"—was inadequate to a discipline that, from her point of view, demanded far too much compliance. She wrote, "In solving problems, you're expected to mimic the instructor's approach." Incidentally, the word "mimic" came up a great deal when outsiders were commenting on physics or mathematics.

Jacki was distracted by complexity; her observation about problem solving was that it was "simplify and solve," and that where she comes from—in the world of creative writing and literature—we give points for finding complexity. In this instance she had to remove that tendency to seek complexity in order to do well in the course—which, of course, was one of my major goals.

The problem of *tyranny of technique* was exacerbated further, in the minds of these outsiders, by narrow skills testing on examinations. They were extremely able on the examinations, and—with one exception—all of them did outstandingly well. The bad news is that they didn't like the examinations at all, coming as they did from other fields. In some of the experimental situations historical material, theoretical material, and conceptual material was presented and even celebrated, but it didn't find its way onto the examinations. Our outsiders—both the professors and the undergraduates—noted that right away. One professor commented, "The way an instructor operationalizes the goals for a course is not simply to speak them or put them in a handout but to incorporate them into his examinations."

More significantly, our outsiders didn't find their exams in physics and chemistry to be "stretch experiences" for them. Eric wrote of introductory physics, "The problems on exams seldom required the use of more than one concept or physical principle at a time. The finals asked only the most basic questions about only the most important laws of physics. We were never required at any time to interrelate concepts or to try to understand the bigger picture." What drove him mad—and this was true of the others—was his own observation that he was fully able to solve problems correctly without under-

standing them in depth.

I wanted to bring to your attention just one more aspect of the presentation of science before turning to how the scientists responded to literature. There's a lot of conventional wisdom that the young people who do poorly in science and mathematics at college somehow are unable to deal with abstractions. It was particularly useful for me to have as my experimental subjects professors with research degrees in fields other than science—who clearly *are* able to deal with abstractions—and graduate students in literature, anthropology, American studies, and the like, hoping they would comment on the role of abstraction in these subjects.

One from the Chicago experiment wrote, "There is in physics an extraordinary combination of the concrete and the abstract, and that was the problem—not the abstractions, per se." They had much more trouble with the concrete than with the abstract, these outsiders. It particularly expressed itself in response to the demonstrations. Demonstrations—in the minds of the professors of science—are meant to clarify, to elaborate, to expand upon, to say in yet another very visual way what the professor just finished saying in a verbal way or in a mathematical way. For a lot of our outsiders, the demonstrations didn't work.

There was a great deal made of *language*, and I'll use that as a transition to the comments made by physicists and scientists studying Chaucer in a criticism seminar. They were sophisticated enough to know that science and mathematics use language in very precise ways, so that they are almost dialects of English, and that you have to master the specific meaning in order to use it.

Stephanie, an American Studies graduate student who was taking chemistry in the longer experimental situation, wrote, "I process information in a different way than it was taught or utilized in this chemistry course. I learned to understand by putting concepts into my own language. If I can't do that I am reduced to memorizing them and spitting out the words as I receive them."

You may say: Putting this into your own language doesn't work in chemistry. That may be true, but the outsiders need some bridge to their own. A professor said, "In science I discovered you don't get into the concepts as I am used to doing by learning the words. You really only understand the words after you have grasped the concept."

Now the reverse. When I reversed the experiment, I asked the professors to start journals even before the course began, because they might have some anxieties that would be interesting for them to explore or some predictions about how they would do. One, a professor of chemistry at Cornell University, was kind enough to write in that journal even before the course began—but after the books arrived—that when he heard it was Chaucer and Wordsworth he was pretty sure he would not be able to grasp the Chaucer. Wordsworth wrote about nature, and he predicted that there might be some

means for him to gain access to Wordsworth.

The books arrived in his office, and he noticed that the Chaucer was a big, hefty volume—all of Chaucer. The Wordsworth consisted of two volumes of poems: the Prelude and the others. He wrote in his journal that he realized in that moment—when he unpacked the books—that of course for him the Chaucer would be more accessible: It looked like, it weighed like, it was organized like a chemistry textbook. Better yet, the first assignment was on page one. It would be a vertical subject, the kind he's good at, and he'd be able to build. On the other hand, the first assignment in the Wordsworth—a collection in no particular order—was on page 127, and at that point he anticipated that the Wordsworth would give him more trouble—and not surprisingly, it did.

We had a lot of commentary on the mode of presentation because these faculty members, like the ones in the opposite experiments, were trying to bring a familiar grid—what works for them—to bear on very different materials. An engineering faculty member wrote, "The mode of presentation—start talking and keep talking—was certainly different; I almost said 'disconcerting.' Engineers tend to think graphically and to seek structural models for everything, so my notes have lots of graphic doodles in the margin."

He and several others wrote that they were very distressed by the fact that there was nothing on the blackboard: no diagrams, no key words, no outlining, nothing. "I found it very hard to follow a lecture that was just words and more words." Now think about that, all of us who teach this way.

The scientists had trouble particularly with what they called the lack of linearity of the seminar. The problem to them seemed to be one of sequence. One wrote, "I'm not sure where we're headed. We seem to jump all around. No apparent focus or 'logical' order." Maybe there was a logic there, but it wasn't his logic. Another said, "I got little sense that there was something that absolutely had to be accomplished in any given lecture. If it had to wait until the next lecture, no problem." Here is a seminar where the teacher says, "Well, we didn't get to that poem; it's okay." It leaves them nervous.

They also were struck with "the intellectual flatness of the field": that is, the lack of a strong hierarchy of abstract principles. In science and engineering we claim to build multi-story edifices, starting from strong but simple foundations with the elegance and subtlety of the principles and relations growing as one ascends.

If this is not going to build, how do I know when I understand? How am I going to build my capacity for structure into this intellectually flat environment? Indeed, they found much of it very uncomfortable: "reading something and not knowing exactly what it meant, even after I was told that 'extracting the various meanings' is the point of the exercise."

The members of this seminar had to write three papers. One was, "How seriously does Chaucer take the Prioress?" Our engineering professor said he had expected the

answers were going to be hard—but the questions were impossible. The outsiders did their best. One wrote two whole pages on this topic and showed it to his wife before handing it in, and she said the paper was too short. "Honey," he said, "what do you mean, it's too short? I said everything I could possibly say." He got the paper back from the professor with the comment, "too short."

There are conventions. We who teach these subjects have a certain sense of how much you have to write to do well, and I've heard from engineering students that what bothers them so much about crossing this particular disciplinary boundary into a course with papers is, "I never know when I am finished." When you solve a problem, you know by the solution; if it checks, you know you are finished. With papers, you don't know when you're finished.

They were skeptical, our outsiders: in awe of their teachers and the quality of their language. In fact, their observation about teaching introductory science and teaching literature came down to this: They found the literature more accessible. They did know English, they could read it and follow what was being said, more or less, but they did not think mastery would be within their grasp for a very long time. In contrast, they said, introductory science may be less accessible to the newcomer, but at the end of a semester the student who passes the course should be able to solve problems as well as the professor does, at that level. Maybe we should say to those outsiders to science that we're not going to be able to deliver you easy access, but we are going to be able to deliver you one kind of happiness, and that is mastery.

In the end, what did we learn from all this? First, an observation: The experience of entering one another's classes and becoming learners again is extremely valuable for us as professors.

One conclusion, obviously not my own, might be that disciplinary cultures are so different that it is likely that scientists and literary critics are born, not made: that it would be best for students to find the subjects they are intellectually and temperamentally suited to and leave other disciplines to those who find them more natural.

Another conclusion is to see in the very differences between fields a subject for general education: to talk about—to teach—those very differences.

We college educators owe our students an education that leads them not just out of their ignorance but out of their comfort zone. And those who teach in college owe themselves the experience of being on the boundaries of the disciplines, too.

ALEXANDER S. ASTIN

PREDICTORS OF SUCCESS IN GENERAL EDUCATION

For the past several years, the Higher Education Research Institute has been involved in an intensive empirical study of the outcomes of general-education programs. This project—which has been supported primarily by grants from the Exxon Education Foundation with additional support from the National Science Foundation—represents the first attempt to study the impact of different approaches to general education on student development using a large national sample of undergraduate institutions and a wide range of student outcomes. I would like to take this opportunity to acquaint you with the scope and purpose of this study and some of our preliminary findings.

At the outset it may be useful to say something about what we mean when we speak of the "outcomes" of general education. When we compiled a list of all of the outcomes mentioned either implicitly or explicitly in the general-education literature, we ended up with a kind of laundry list that includes virtually every known student developmental outcome of an undergraduate education.

This exercise led us somewhat reluctantly to the conclusion that there is no way adequately to examine the "outcomes" of general education by using a single or even a small number of student developmental outcomes. On the contrary, an adequate assessment of general-education outcomes requires extensive coverage of both cognitive and affective aspects of student development.

The pilot study also was extremely useful in guiding our decisions about what other program information to collect. For example, the pilot results indicated that many general-education outcomes were likely to be affected by two major factors: the student degree of involvement in academic and cocurricular activities and the quality and quantity of interaction between faculty members and students.

These pilot results led to two major decisions in the design of the outcomes study. First, we decided to collect a wide range of information about the nature and extent of student involvement in various aspects of the academic experience. Second, we decided to survey all of the teaching faculty at each institution in order to ascertain not only the frequency and quality of student-faculty interaction but also their favored teaching methods, examining procedures, and advising and mentoring techniques.

Our intent here was to explore a series of related questions. For example:

- Are there unique features of the campus environment that make for a coherent and successful general-education program?
- How do successful programs work in practice?
- What features of these "model" programs might be replicable in similar types of institutions?

- What program features are relatively easy to implement politically and financially?

Let us examine more closely the specific student developmental outcomes included in this study. Many of these outcomes were "pretested" with college admissions tests and in the earlier survey of students entering college as freshmen in the fall of 1985. The follow-up cognitive posttesting and questionnaires, which were completed in 1989, permitted us to see how each student had changed over the four years and whether particular patterns of change are associated with particular types of general-education programs or particular types of educational institutions or practices.

While the student survey covered the majority of student-outcome measures, two other sources of information on student outcomes were incorporated into the study. First, information on student retention was obtained from each of the participating institutions—which gave us, for each student surveyed, information on how many years of study the student had completed, whether any degrees had been awarded, and whether the student was still enrolled. Second, we were able to obtain from the various testing agencies tests scores for those students who had taken any of the standardized tests required for admission to graduate and professional schools (GRE, MCAT, LSAT, NTE, and so on). More than eighty different student outcome measures were utilized in the overall study.

Let's look at student outcomes from a purely descriptive viewpoint: How do students change during the undergraduate years? After entering college, students become more hedonistic, more concerned with the environment, more liberal in their political views on a variety of social issues, and more inclined toward social activism. They also show an increase in both interpersonal and intellectual self-esteem and indicate a somewhat higher degree of stress than they did at the time they first entered college.

We have several indices of increased hedonism: By 1989, students were more likely to report drinking beer, wine, or hard liquor; smoking cigarettes; and expressing support for the legalization of marijuana than when they entered college in 1985. Two questions revealed a substantial increase in student concern with environmental issues; four years after entering college, students are much more likely to express a willingness to participate in campaigns to clean up the environment than when they entered as freshmen.

Five items revealed greater liberalization of student views on a variety of social issues. What is especially interesting about these trends is that we did not find an overall increase in the tendency of students to label themselves as political liberals. What we did find was a reduction in the propensity for students to rate themselves as "middle of the road" politically and an increase in the tendency to rate themselves as either liberal or conservative. In other words, students become more polarized in their political self-labelling during the undergraduate years.

Four items provided evidence of an increased tendency toward student activism.

Compared to when they entered college in 1985, by 1989 students were much more likely to express a commitment to influencing social values, participating in community action programs, influencing the political structure, and helping to promote racial understanding.

Finally, three questions demonstrated increased stress, including depression and a sense of being overwhelmed by academic demands.

Let us now consider the areas in which students produced lower scores on the outcome measures in 1989 than they did when they entered college in 1985. Students in 1989 exhibited lower scores than in 1985 in four areas: materialism, religiousness, science interest, and status needs—including becoming an authority and obtaining recognition.

Despite the remarkable changes in our society during the past two decades, the changes we have summarized here are similar to changes reported in studies conducted during the early 1970s and even several decades earlier: during college, students tend to become more hedonistic, more politically liberal, and more oriented toward social activism; at the same time, they become less materialistic, less religious, and less oriented toward power and status. They also develop higher social and interpersonal self-esteem. What is new in this particular analysis is the evidence of increased stress.

To what extent can we attribute these changes to the undergraduate experience, and to what extent can they be attributed instead to maturation, changes in the external society, or other social forces? While the analyses designed to answer these more complex casual questions are still in progress, earlier studies (Astin, 1977) suggest the increased self-esteem and liberalism and decreased materialism come primarily as a result of the college experience rather than noncollege factors. Decreased religiousness and increased hedonism seem to result from a mixture of college and maturational effects, whereas decreased needs for status appear to be entirely maturational.

Because of the scope and complexity of our study and the large number of variables involved, we will not be finished with our analyses for some time. We already can see some distinctive patterns emerging from our analyses, however.

First and perhaps foremost is the fact that most student outcomes are not particularly sensitive to the kind of general-education program an institution has. In other words, students will turn out pretty much the same way regardless of how you formally structure your general-education program. By "formal structure" I refer to the sorts of issues that typically dominate faculty deliberations about general education: whether to require any specific courses, which ones to require, how much freedom of choice to allow in a distributional system, which options to offer within each distributional category, how much of an interdisciplinary emphasis to include, and so on.

The only curricular variables that show any consistent effects on student outcomes

relate to the quantity of courses taken in general content areas: science, humanities, and so on. Furthermore, the only outcomes that are affected by these course-taking patterns are scores on standarized tests.

What, then—if anything—in the undergraduate experience seems to matter as far as student outcomes are concerned? While our results are not yet final, we can see some distinctive patterns emerging. To begin with, the manner in which the curriculum is implemented seems to be much more important than the actual form or content of the curriculum. I refer here to the types of instructional methods used, the nature of faculty-student relations, and especially the quality and quantity of student contacts with the peer group. Peer groups seem to be especially important in affecting students' values and beliefs, as well as their level of satisfaction with the undergraduate experience.

What these results suggest is that we need to rethink radically our traditional institutional approach to general education. Curricular discussions, it seems to me, are focused far too much on content issues. Our research findings suggest that curricular planning efforts will reap much greater payoffs—in terms of student outcomes—if we focus less on content and put much more emphasis on pedagogy and other features of the delivery system, as well as on the broader interpersonal and institutional context in which learning takes place.

We are especially intrigued by the possibilities that our findings suggest concerning peer group effects. If the student's peer group is potentially the most powerful influence on student outcomes, why not take advantage of this fact in designing our curricular delivery systems as well as our cocurricular programs?

Take instructional method as an example. The traditional lower-division class involves a good deal of lecturing, possibly some class discussion, some individual out-of-class work, course exams, and letter grades. Under such a system, individual students work pretty much on their own and peers are viewed essentially as competitors. Classroom research has shown consistently that cooperative learning approaches produce outcomes superior to those obtained through traditional competitive approaches. Our findings concerning the power of the peer groups offer a possible explanation: Cooperative learning may be more potent than traditional competitive methods of pedagogy because it motivates students to become more active and involved participants in the learning process. The one activity that had consistently positive effects on students' standardized test performance was tutoring other students.

One of the most important issues in curriculum design is the values that we communicate to students when we establish certain requirements. Take just one set of bipolar values where the research shows very large gender differences: competition versus cooperation. The fact that men tend to be much more focused than women on issues of competition no doubt accounts, at least in part, for our inclination to view human histo-

ry in terms of competitions between different peoples and cultures and to use the most extreme form of competition—warfare—as a means of identifying key historical periods.

Under these circumstances, why shouldn't the capacity to be a good team member and to work cooperatively with colleagues be one of the "basic skills" that we try to develop in our general-education programs? We hear a lot these days about developing critical thinking and communication skills, but most of the focus is on improving writing, computing, and speaking; few of us talk about the art of good listening. This neglected skill is not only of great practical importance in many career fields, it also epitomizes for me the essence of the cooperative spirit. Being able to listen to and understand the thoughts and feelings of others is of vital importance in developing the trust and empathy so necessary for cooperative living.

What really concerns me about the "P.C." debate is that it once again focuses exclusively on curricular content. As I have suggested, preliminary findings from our general-education outcomes study suggest that our most important teaching may be independent of course content. This "implicit curriculum"—as I have called it in earlier writings—includes not only the teaching methods we use but how we grade and test our students and how we treat each other as professional colleagues.

This implicit curriculum clearly tends to promote the value of competition much more than the value of cooperation. For example, our favorite method of instruction in the classroom is still the lecture, which tends to put students in a passive role and encourages them to view learning as a solitary process where students work independently and compete with each other for grades. The letter grading and norm-referenced testing systems we use really do not tell us much about how effectively we are teaching or how much our students are learning; rather, they merely encourage more competition by comparing students with each other. These classroom practices are particularly regrettable given the growing body of research that suggests that cooperative learning approaches—in which students work together in small groups and help teach each other—are far more effective in developing students' talents than traditional competitive approaches.

Our faculty personnel policies seem to promote similar values. Faculty members in our major universities are hired and promoted primarily on the basis of their research—a highly individualistic and competitive activity—rather than their performance as teachers or mentors. At the same time, good colleagueship—a cooperative activity—gets little, if any, weight in the promotion process. Moreover, departments compete with each other not only for resources but also for a piece of the curricular action. Interdisciplinary courses and team teaching, which would symbolize a cooperative value system, still are much too rare in academia today.

In higher education, we have tended to emphasize the so-called "cognitive" side of

learning, even though our college catalogues frequently mention "affective" goals such as good citizenship. Democracy, of course, is based fundamentally on a cooperative concept of governance. While the idea of good citizenship in a democracy like ours necessarily includes the notion of an informed and involved electorate, recent elections suggest that our citizenry probably is not very well-informed and certainly is not very involved in the democratic process. If I were able to effect just one change in our curriculum and our implicit curriculum, it would be to put much greater emphasis on the importance of producing graduates who appreciate the importance of being well-informed and active participants in the democratic process.

In closing, let me offer a simple plea for all of us to pay attention to the values that underlie not only our curricular decisions but also our implicit curriculum. I see everywhere the great achievements of the intellect: atomic energy, genetic engineering, modern agriculture, modern medicine, computers, and other electronic marvels of every conceivable type. At the same time, however, I see the great affective and emotional and spiritual divisions that threaten our very existence: religious fanaticism and hatred, racial prejudice, nationalism and other political divisions, widespread criminal behavior in the land of opportunity, and massive poverty and starvation in the face of unprecedented affluence. What this tells me is that it is time to redress the balance. It is time to begin shifting some of our curricular attention in the direction of our affective side—to begin concerning ourselves much more directly with the development of beliefs and values that will heal our divisions and help to create a society that is less materialistic, competitive, and selfish and more generous and cooperative.

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EZRA SHAHN
ON SCIENCE AND GENERAL EDUCATION

I have given this talk the very general title "On Science and General Education" so that you will have some idea of where I'm going. I will tell you my outline in five journalistically appropriate words: why, what, who, when, how.

The *why* essentially examines the goals of science in a general-education context. One goal is helping people prepare for careers, either for themselves or in the national interest. Another is explicating current beliefs regarding science—including, perhaps, the history and development of the foundations of those beliefs. Yet another goal might be attempting to help students understand changes in world views over the years. Still other goals might be to emphasize the role of the social context in which science has developed, pursue the implications science has for philosophy in general, or explore the ramifications of science on one's daily and reflective lives. And some courses have the goal of showing students what it is like to think like a scientist: to analyze problems and pose questions the way scientists do.

One of the major goals of science education in a general-education context today—acknowledging our phenomenal science illiteracy—must be to prepare our students for active parenthood. Children are born with a scientific inquisitiveness; somewhere between the ages of three and seven, however, most of them are trained to abandon it. Most parents cannot answer their children's questions. Go to a museum; watch parents and children tour the exhibits; listen to the misinformation parents give to their children as they themselves are incapable of reading and interpreting the captions: You will see the need to meet this goal of science education.

If the goal of general education in science is to provide students with science literacy—which I would define as the ability to read between the lines—the ability to use language is involved. While people often approach science as though they were learning another language, this is inappropriate. What they really are doing is extending their first language: trying to find a way of grasping the logic of nature as opposed to the logic of language.

Other goals include giving students skills of some sort or giving them mastery of content. There can be no content that defines science literacy, however. Literacy—of any sort—is not a content but an ability; science literacy is the ability to understand scientific material.

These are goals that a course of science in a general-education context might pursue. I don't know that all of them could be pursued in one course; probably, they cannot. Nor is it likely that students are capable of picking up all of these goals if the attempt were made. We cannot answer the *why*, then, without considering the *what*: What do we really wish to accomplish with a general-education science course?

For *whom* do we want to provide this general education? If anything, our students are a phenomenally varied and heterogeneous group. On the one hand, of course, there are the science majors, who need not only education in their particular major but general education in science as in anything else. Beyond them are the students Sheila Tobias refers to as "the second tier"—those who might have been science majors but were turned off to science. A third group are the bright but otherwise-directed students who may not be particularly interested in science but are interested and competent in other areas. They, too, need a general education in science. Finally, there are others—perhaps most of our students—who are inadequately prepared, who have varying degrees of intelligence, who also must be equipped to cope with the demands science places on them in today's society. One might argue that each of these groups would need a different approach.

I believe institutional character will determine what is meant by "general education." A selective institution clearly will be able to frame its curriculum differently from an open-admissions institution. In our course at Hunter College, we have students who are not firmly convinced that the earth goes around the sun. Even those who are persuaded do not know how this can be proved. Lynne Cheney has capitalized on the study of Harvard graduates showing that they cannot explain the change of seasons in the northern hemisphere! Students in all institutions are woefully unprepared; these are the students who enter our classrooms.

When? We all know that college is far too late, even though that's when we become involved. In a sense, then, what we're doing with general education in science today is a holding action.

When? In one term, or perhaps in one year. Given students' lack of preparation, one might also say this is far too little time. Again, different institutions can cope with this in different ways. What they do depends upon their character or the character that the institution wants to define for itself.

How? Initially, we say, with courses. This may be the wrong way to teach science; it may be the wrong way to teach everything. Nevertheless, that's what most of us are paid to do—even if we're not committed to doing it—and it's what most of us will do. I would add that science courses must be taught with laboratories or with some comparable experience. There is a word for teaching science without a laboratory: *scholasticism*. One cannot teach science without a very clear recognition of the phenomena or the experiences that science is trying to deal with. Given the lack of experience that our students have today, we cannot simply use words to convey the experience.

We also cannot refer simply to casual experience. We have to re-create appropriate experiences. We might do it with tracks for the more able and the less able. We might do it with apprenticeships, though that entails expense; it would be delightful—though

it never will happen—if everybody could have a one-month apprenticeship in a science lab. One also might arrange some sort of project which shows—in a way that individual work does not—the necessary teamwork that goes into science: the ways people with different abilities contribute to developing understanding.

This *how* implies as a subtext the problem of pedagogy. Unlike most areas, science-education research is a very active field. People have investigated the ways people learn and mislearn science—and why. We know that novices approach solving a problem entirely differently than do experts, and we know—to some extent—how experts have achieved their expertise. These are things that cannot simply be told or shown to students any more than you can tell an infant how to walk. These are things that come with practice, with development, with motivation.

There also are misconceptions: Although people have ideas about the knowledge they are approaching, many of their ideas are incorrect. Typically, when people are told what is right, they simply rearrange what they are told so that it fits their misconceptions. It doesn't even help to arrange a situation that creates a cognitive dissonance and confronts them with a belief and a fact that are not the same. The ability to recognize this dissonance requires abstract thought, which is a capability not everybody has. In a Piagetian context, abstract thought is not one skill or ability but many: isolation and control of variables, probabilistic reasoning, proportional reasoning, combinatorial reasoning, correlational reasoning, and the ability to recognize inconsistencies. Students may have some of these and not others. People competent in one discipline requiring abstract thought may not immediately be able to apply it in another field.

Having listed the issues of why, what, who, when, and how, let me mention a number of problems that are encountered when people of good will start to address the issues of modifying curricula or creating new curricula, incorporating serious science into a general-education program.

One is that students have preconceptions—which I think are misconceptions—regarding both the nature of learning and the nature of science. The "traditional freshman" who is a full-time eighteen-year-old student has been told throughout high school that to a very large extent learning is, in effect, memorizing. These freshmen, for the most part, are not actively involved in exploring the nature of what they're doing.

They also believe that science is a body of truth obtained by going into a laboratory and making a measurement. This hardly could be further from the fact, of course. Scientific statements are not immutably true, although students think they are. This, then, is one of the first things we have to get out of their heads; yet if we try to do this by showing how scientific understanding of the heavens developed, for example, students get confused. They ask us: "You mean Copernicus wasn't right? Or Ptolemy wasn't right? Or whoever it was, wasn't right? Why did you tell us about him?"

A second problem is faculty reluctance, or even hostility, about getting involved with general education. The reasons for this are myriad. From one point of view, there is little reward. (I once said that teaching, like virtue, is its own reward.) Beyond that is a lack of student motivation. Students are hostile to science, but they are hostile to many general-education requirements outside their disciplines. If students do not see the relevance of science to their daily or intellectual lives, how can we demonstrate it with one science course?

At Hunter, when we talked about Galileo and his contributions both to experimental physics and the understanding of the heavens, we mentioned that he was born in the same year as Shakespeare. One student who was taking a Shakespeare course at the same time suddenly realized that Shakespeare's contribution—whatever else it was—was to put into poetry the contemporaneous cutting edge of scientific philosophical work. Her estimation of Shakespeare went up. It might be possible to find aspects of science that relate to courses across the discipline so students repeatedly see that science affects what they are learning.

I want to raise two other problems briefly. One is that it is not yet clear how science can fit into a multicultural curriculum if such a curriculum is the goal of an institution. A second is a very serious lack of institutional commitment to general education as expressed by faculty members who teach. Far too few are prepared to perform the feats of intellectual integration that we expect of students. If that issue could be addressed, I think we would be well on our way toward achieving some goals in general education as a whole as well as in general education in science.

CAROL G. SCHNEIDER

GENERAL EDUCATION IN HISTORY AND CULTURE: OVERVIEW OF PRACTICES

I currently direct an Association of American Colleges project called Engaging Cultural Legacies. Funded by the National Endowment for the Humanities, this initiative focuses on the development of required core courses in the humanities. I want to describe some of the issues that have emerged in this project and suggest ways in which they may be revealing and instructive for those in the process of revising core programs—or any programs that introduce students to the complexities of cultural heritages.

I want to come back to my experiences, first, of entering a Western civilization faculty at Boston University twenty years ago and, more recently, of teaching in the Western civilization program at the University of Chicago. Both programs were long established when I began teaching there. In fact, however, there is less dialogue in each of those curricula than there ought to be. Faculty members coming into a program that was established ten to fifteen years ago understand what it's about only from the outline of other people's work. The conversation that ought to be there—the continuing questioning—all too often is lost once general-education reform is pushed through.

The crucial point is this: You should assume that part of your task in working on general-education reform is to create the structure of a continuing conversation among faculty members that will outlive the design period. Nothing is more important.

I want to generalize here about some of the issues that institutions are struggling with as they work to put together such programs. James Redfield pointed out that one of the features of our society is that it is constantly inventing and re-inventing itself. At the moment, he said, this country is engaged in a major reconstruction of its own story, of the stories it tells to itself about itself. The institutions that have come into AAC's project all are engaged in a significant struggle with the questions, "How do we represent our self to our students? How do we invite them into some sort of conversation about this culture, this society? What is it we mean them to encounter?"

The answers are very much in flux. The questions of who the "we" is and which culture we're talking about are hotly contested. As soon as you make the decision that you will have some sort of a common experience in the humanities or in history and culture, you immediately wade into these major struggles with the question of what, why, who, and from whence.

At the same time, because our institutions are so diverse we are more aware of the complexity of the world of which the United States is a part. There's a much more pronounced trend than there was perhaps ten years ago toward trying to create or re-create a common experience that will construct a common ground in the curriculum out of which students can begin their conversation again about who the "what" is, who the

"we" are. Trying to create a common experience is high on the list of many institutional agendas, even as the question of what would be in that common experience becomes more contested.

I have selected three syllabi in order to talk about specific issues. The three examples illustrate some of the strategies that institutions are using. "Western Mediterranean Culture"—probably self-evident as you look at this—is chronologically oriented. There seems to have been a decision to try to cover, chronologically, selected cases that in some way or another represent a picture of Western civilization. It looks very much like all the Western civilization courses I taught.

I picked this particular course in part because of the last section, which begins with Marco Polo. As institutions are struggling with the question of how to represent the Western story, more and more of the kinds of issues that are hinted at in this list of texts are making their way into these courses. That is, we are now seeing the Western story—in addition to some of the other things we used to tell about it—as one of encounters with other cultures. There is more of an attempt to foreground that issue in constructing selected cases from all the historical possibilities.

What do you envision the student body to be for this? That's one of the questions that many of you who struggle with these issues will have to ask yourselves: whether there are some classic issues and classic texts that represent themselves to students from *any* part of American society, or whether there ought to be more direct engagement by students with the representation of our society, our tradition, that is being opened to them. Does it matter if many of the students are Hispanic and a course like this ignores Hispanic legacies altogether?

The next example is "Humanities: Ideas and Ideals." The strategy of this course—the first in a four-course series—is to take a picture of some facets of what we might think of broadly as Western culture and look at those analytically rather than chronologically. It is, as I said, the first in a series of four; the second is "Science, Culture and Technology"—another slice of Western society. The last two courses are "World History," which looks at the rise of the interdependent world system over two semesters.

One of the issues we all struggle with is the question of what I call *pedagogical viability*: some way to get students interested, as opposed to what might be a more balanced or historically nuanced representation of either the humanities or Western culture. One of the things I see in these two courses is different decisions made about a fundamental problem that comes up whenever humanists get into these issues: Are we going to foreground the text? The first course does foreground the text, giving just a few texts and lots of opportunities for students to read them as ends in themselves and secondarily representing some trajectory of the development of one interpretation of Western civilization. The other course clearly has subordinated the texts to the themes on the theory that

that is a better way to get students involved. The themes selected are themes with which the students can connect.

This leads me to the third outline, "World Cultures and Traditions." There were a couple of comments earlier that "Humanities: Ideas and Ideals" was not drawing its texts from a wide enough selection of world possibilities. This course clearly has responded to that challenge. In the first semester, culture is treated analytically; the course simply examines different facets of the construction of a culture, beginning with culture theory and then looking at—for instance—use of language, communication and art, race, class, and gender. In the second half of the first term, each instructor selects one of the half-dozen possible themes and explores it in some detail. One instructor might be teaching on human nature; another might turn to nature, science, and technology. My understanding is that the faculty members have agreed that they all will teach the outline using these themes to represent world cultures to their students but that the actual texts will be left to each instructor to choose.

In this third course, the question of the text becomes secondary to the analytic paradigm that is being opened to students. In the second semester, when students are looking at the dynamics of culture, they begin by looking at different ways of thinking about change in cultures over time and then at some of the dynamics of cultural interaction. First, students will have a snapshot; then they will be introduced to some of the conceptual issues that are involved in thinking about change in any society.

I put this in front of you for a couple of reasons. One is that a major trend in constructing these courses is to move the West out of the way and to foreground the world. And if it was hard to represent some version of the Western story, it's even harder to foreground a version of the world story or a set of world stories. The strategy of this "world" course is not to teach about any particular culture; it is to teach about culture as an analytic framework. It comes back to one of the things that AAC recommended in its own report, *Integrity in the College Curriculum*, in 1985. You don't have to cover a particular content; what you really want to do is to give students analytical capabilities they then can apply to other possibilities. The question of whether this is satisfactory as our one required core course is another question.

It seems to me that if we have only one opportunity, we might like to explore something in enough detail that the student could apply the paradigm to it and leave the course with some confidence that she knew how to use this paradigm in a particular instance, however arbitrarily selected. That obviously is not the decision made by this faculty.

Let me mention one other problem that emerges from many of the syllabi developed through the Engaging Cultural Legacies network. Predictably and recurrently, gender, race, and ethnicity are being added to the mix. What has disappeared from these courses is what used to be their rationale and their justification, which in fact is the

"rise" of Western institutions, democratic participation, the practices and values that used to be thought of as constituting a kind of Atlantic culture.

Faculty members, apparently in droves, are moving away from that as an outmoded, old-fashioned, parochial—perhaps imperialistic—way of thinking about our own story, and no one is telling that story. I have not seen a single syllabus that has found a new way to tell that old story. It is gone. Yet when we think about some of the offenses of marginalizing particular groups, there are offenses against that bigger paradigm of democratic participation and values.

I would invite those of you who are creating these kinds of courses to look hard at the question of just what your students have had in high school. Most of them have not had anything like the background that we are presupposing in our own culture and society. Those of you who are working on these issues in your institutions might think about not just new representations but finding some ways to reconstitute some of the older stories, with power and significance, for your students.

VIRGINIA SMITH

THE PURPOSES OF GENERAL EDUCATION AND IMPLICATIONS FOR PEDAGOGY

The Study on Good Practice was sponsored by the Society for Values in Higher Education and funded by the Exxon Foundation and the Ford Foundation. Although some five or six studies were underway nationally on higher general education, this is the only one that includes two-year colleges in its scope. This is important because so many of our students take general education initially—and often only—through a two-year college.

The study had two major elements: first, a questionnaire that went to chief academic officers at all universities and colleges in the United States; second, site visits to a dozen or so colleges identified by chief academic officers as having admirable general-education programs. I want to distill the emerging general conclusions.

I found, as Sandy Astin did, that the literature about general education lacks much in precision of concepts. "General education" and "liberal education" tags seem to be applied to a whole range of programs and purposes. Often, even though we use the same terms, we're really talking about concepts with different assumptions. Gary Miller's *The Meaning of General Education* highlights some of the differences between those two concepts. He doesn't believe that general education is so concerned with enduring truths—the essential or universal truths—but rather with those that relate to particular contexts, often at particular times.

In our questionnaires (on which we received a 47 percent response), two questions helped us understand how academic administrators defined general education on their campuses. The first asked for the most important characteristic that their general-education program had; the second asked how it was defined on their campus. After reading both sets of answers—the definition and the major characteristic—I conclude that general education now means neither the traditional liberal education model it was designed to replace nor the general-education model as defined in early literature. We do indeed lump together a whole set of purposes, including the more traditional view of liberal education, and call them all either "general education" or "liberal education." The resulting programs differ from campus to campus. Some way of identifying these differences must be found if we are to talk about them, compare them, plan new programs, and assess their effectiveness.

Based on the material we collected, I developed a list of six key purposes by which the two can be differentiated.

The first purpose is heritage: providing a common core of great ideas or great books to pass on a common Western heritage.

The next purpose is counterpoint: exposing students to a broader range of subject matter than they would find in their majors to achieve breadth.

The third purpose is developing particular skills, such as writing, speaking, critical thinking, or instrumental skills. It differs from the following approach—developmental or empowerment—because here the individual skills are taught as ends in themselves.

The fourth purpose is developing the whole learner, particularly the basis for becoming a lifelong learner: teaching people to learn how to learn and to take responsibility for their own learning.

The fifth purpose is social agenda: infusing the general-education component with some social purpose, such as global awareness, environmental sensitivity, or preparation for responsible citizenship in a democratic society.

The sixth is valuing: helping students perceive what values are operating in a situation and how the values are determined. A few institutions indicated they wanted to inculcate certain values.

Some programs would combine all six purposes; some would combine two or four; in some cases, certain purposes were weighted very heavily while the others were given only a nod.

At a recent Council of Independent Colleges institute for deans, the participants were asked to rank the importance or priority of each of the six purposes as demonstrated by the educational strategies used to accomplish general education on their campuses.

The purpose most closely related to Miller's idea of liberal education is heritage, but only 29 percent of the respondents placed this among the top two priorities. Counterpoint, on the other hand, was among the top two priorities for 56 percent. A full general-education paradigm as developed by Miller probably would address purposes of skill development, empowerment, social agenda, and values. None of these purposes except for skill development—identified by 69 percent in the top two priorities—received high priority ratings by the deans. There seems little question that the counterpoint purpose still is the most common purpose for general education, at least among those institutions represented at that assembly.

I decided it also would be interesting to use this set of purposes with the faculty at a single campus—a small liberal arts college. I had them rate the purposes in the same way. I asked them first to rate what they saw as the ideal. On this particular campus, heritage had the highest rating; counterpoint was lowest. Then I asked them to rate the system they presently had on the campus, and it was possible to begin to see some dissonance between what they thought should be the program and what actually was the program. They saw that they were moving now in terms of the third and fourth purposes, but they had done nothing about the first purpose. Now, in a way, this correction activity is taking place at that campus.

The second part of this project included site visits and discussions with campus-based personnel. What we found was that many of the programs were very idiosyncratic.

It was hard to talk about an ideal model of general education because indeed there is no single model of general education. It grows out of the history of each institution; out of the faculty resources at the institution; out of the kinds of students at the institution; and it takes many, many different shapes.

I want to mention two other extremely important purposes that usually don't appear on any list of educational purposes—but you'll recognize them. One is the purpose that works its way into the design for retaining or enhancing the number of faculty slots in the department.

The other purpose that should be added relates to community colleges. Many of the community college definitions of general education include the phrase, "General education is that which can be transferred." So you get this rather unusual situation of the large four-year institutions in a state determining what should be taught at the two-year institutions—which have a different set of resources, a different student body, and, probably, different expectations for their entire program.

If you compare the number of students entering community colleges who think they will go on to four-year colleges to the number that actually do go on, you find that the vast majority do not continue. If you plan your programs for students who do go on to four-year colleges, you may be overlooking the educational needs of those who don't go on.

These purposes have some importance beyond categorization; if that's all we did, they would not be particularly valuable. We look at the purpose, however, in terms of the unit of presentation or in terms of the time bias.

Then we look at the implications for pedagogy. For heritage, it is possible to have lecture and discussion. Counterpoint obviously varies. In skills instruction, it is more likely that you'll have smaller classes and some tutoring—with some chance for peer tutoring—and probably set exercises. In development and empowerment you will have exercises, small classes, and frequently something in the way of shared responsibility or activities in which some of the students take leadership roles for certain parts of the course. Social agenda involves discussions, exercises, and projects; values involves discussions, experiential learning, perhaps role-playing and self-testing on a whole range of values.

These purposes also have implications for assessment. Only in counterpoint is it possible to have assessment solely within the classroom; only in counterpoint is everything left up to the individual instructor; only in counterpoint can you express the whole general-education program through the discipline-based departments. Only in a manipulation of counterpoint can you make changes in the program without making any significant organizational changes in the institution or thinking through any of the basic educational values that the faculty or administration may have.

I want to describe some of the most common characteristics in the admirable general-education programs. First, the programs that seemed to have quite a bit of power

were those that were quite self-conscious and deliberate; there was a climate, a set of words, a language, that surrounded the programs so that people talked about it and were part of an inside group. Everybody throughout the organization had bought into the system and could talk about it and why it was the way it was. When you find that, very frequently you have an exceedingly strong system and a powerful education program.

The strongest programs also exhibited collaborative aspects. Sometimes it was collaboration on the part of planning teams, sometimes team teaching of the courses themselves, sometimes collaborative work on the part of students; sometimes it was all three.

This collaborative work—the collaborative planning of courses, the sitting in on courses that others are teaching—is a way to deprivatize teaching. Teaching is an extremely private kind of activity: private not from students but from professional colleagues. We do research in private, but then we share it publicly. We don't have the vehicles to share teaching among our professional colleagues; often, the result is that we don't get really intellectually stimulated about it. We don't talk with our peers about what kinds of instructional exercises seem to be working extremely well. Deprivatizing teaching is a way in which teachers are more stimulated by the process and find it affecting their teaching in all of their courses. Teachers in some of these deprivatized courses say that they will never teach the same way again in any course.

There also is a strong emphasis on interdisciplinarity and an attempt to extend general-education purposes. In fact, some of the institutions that had the most admirable general-education programs didn't have anything they called "general education." They were talking about their whole undergraduate experience, which they considered important for all of their students so it extended throughout the undergraduate educational experience. In almost all of them, there were strong planned instructional exercises, and these instructional exercises often were staged in a way that brought students along at levels that made it possible for them to move on to the next level.

We hear that how lamentable it is that we don't all read the same books, and we don't have a common learning community in colleges because not everybody has read X. In some of these colleges, the common learning exercise—which has clearly defined aspects and stages to it—if taken by everybody, can create that same sense of community. The exercise can do it as well as the book, or in addition to the book.

In almost all of these cases, there also is a continuing vehicle for faculty discussion and revision of the programs. There also is a shift toward the teacher as coach, guide, mentor, leader, stimulator more than as expert authority and evaluator. This is consistent with assessment programs that deemphasize grades and emphasize instead improvement comments. There was less emphasis on sorting and more emphasis on learning. It did not mean that they eliminated grades; it meant that they put something else in their place.

If you look at the ways of change in higher education, they all seem to be responses to problems. The one problem I see people beginning to respond to now is the concern about fragmentation. We're trying to find ways to combat that feeling of fragmentation. When we introduced electives, it was from concern about rigidity and the lack of involvement of the people you were regimenting. Now we're responding to a different problem: fragmentation.

When we talk about purpose, it is easier for us to evaluate a variety of strategies. Most of our arguments tend to be arguments over strategy. If we can free ourselves from looking at, and talking about, just the strategy, however, and move back to the purpose, we can begin to say, "How does this strategy relate to this purpose?" That's what I tried to do in showing how the unit of presentation, the assessment, the pedagogy, and so forth tends to be different with different purposes. If you move, then, from purposes to outcomes, you can vary the strategy even more.

PATRICK J. HILL
THE ECOLOGY OF GENERAL EDUCATION

I approach general education both as an analyst and as an advocate. As analyst, I make four major points.

First, there is a great variety of things—many of which are not terribly compatible with each other from the standpoint of educational and social values—all lumped together under the heading of general education. Second, these diverse efforts are each reflections of somewhat unshared diagnoses of the ills of higher education and of American society (for example, the absence of core values, inadequate knowledge of Western or global civilization, and so on), followed by more or less appropriately chosen strategies or prescriptions for reform in the service of equally diverse visions of higher education and American society.

Third, there are both intended outcomes and unintended outcomes in any general-education program. These latter outcomes—deprecatingly referred to as "by-products"—are just as important in a full, non-self-serving assessment of the impact and worth of a general-education program as are the intended outcomes.

Fourth, I refer to this full assessment of the impact of a program as the ecology of general education. Informed by the first principle of ecology—namely, that it is impossible to do only one thing—I want to look not only at fairly obvious things like the institutional consequences for faculty members or for departmental commitments but more interestingly at unintended educational outcomes, which—at least from the perspective of different educational and social vision—might be regarded as unacceptable consequences.

For example, might a reliance upon the institution's most engaging and most interdisciplinary lecturers result first in larger classes and then in less attention to writing? Might more attention to writing be perceived as preparatory or remedial education, resulting in an increased drop-out rate for less-motivated students? A reform of any sort will have unintended consequences for a whole range of educational values like active learning, self-esteem, bridging theory and practice, multicultural awareness, appreciation of disciplinary cultures, and so on.

Given the great variety of educational visions embodied in general-education programs, the conflicting values that animate them, and the lack of attention to at least the unintended consequences of the programs, I am not at the present time able to describe myself as any more in favor of general education than I am against it. It is a mixed bag.

As advocate, of course, the story is different. There are particular kinds of general education I do favor. The one I favor most begins with a diagnosis that higher education ought to be preparing students for the challenge of democracy in a world of rapid change, enormous complexity, and radical diversity (cultural, subcultural, ideological, and disciplinary), and identifies the greatest single threat to the preservation of democracy as the

alarming passivity of our student bodies and our citizenry. Believing that passivity in large measure is induced by the standard curriculum which employs the isolated or atomistic three-credit course as the sole building-block of the student's education, I advocate a certain kind—by no means any kind—of learning community: one that is problem-focused, multicultural, multidisciplinary, and focused primarily (though not exclusively) on discovery and creation rather than on transmission of already-discovered knowledge or skills. In such communities, students will have the experience, not just read about but actually have the experience, of bringing into existence and sustaining a radically diverse community. The skills necessary to negotiate such a community would define for me the general education most relevant to our democratic society at this time.

Given my biases about what would be most worthwhile to do, I variously assess the reform efforts on many of our campuses. Great, time-consuming, and frequently divisive efforts to effect institution-wide agreement on a set of courses, skills, or values strike me for the most part as undesirable: The greater the agreement, the more vague the content of the agreement.

What needs to be done is to stop treating diversity as a defect and start treating it as a resource for our students' learning. This can be done in a number of ways. One way is to be satisfied with vague institutional agreements and give free rein to the energy and creativity of different groups of faculty members to implement the agreements differently over a specified period of time. Another way, suggested by the Association of American Colleges' study on the major, urges the departmental major to contribute to general-education outcomes by structuring curricular-based and credit-bearing conversations with other disciplines around commonly shared problems. A third way, forcefully advocated by Gerald Graff of the University of Chicago, is to make the conflicts which currently divide the academy and our society the actual subject matter of the curriculum. A great variety of curricular innovations, including some versions of learning communities, have surfaced to implement this challenging idea.

JAMES L. RATCLIFF

WHAT THEY TOOK AND WHAT THEY LEARNED: LEARNING FROM ASSESSMENT AND TRANSCRIPT ANALYSIS

Since 1985 I have been examining ways to link what students take in college with what they learn in college. I am with you today to share what I have learned about teaching, learning, and advisement. We have discovered some exciting linkages, and it is my hope that our modest labors will provide an additional basis for further exploration of the relationship between general education, good teaching, and assessment of learning at your institutions.

Since 1986, we have examined more than sixty thousand courses appearing on the transcripts of some fifteen hundred graduating seniors at five different colleges and universities. During each academic year, these seniors also accepted our invitation to take the General Test of the Graduate Record Examination. Each group of seniors came from a cross section of majors. They also reflected the full range of academic ability (as indicated by SAT scores) for the general population of students at each institution.

Controlling for incoming ability through SAT scores, we examined the improvement these students showed in nine areas of learning embedded in the GRE exam. Once we had assessed the improvement in general learning among these seniors, we next attributed that improvement to the courses in which they had enrolled. Once we had attributed improvement in the nine areas of student learning to each course, we next sorted the courses by those nine areas of learning. We worked with the 303 courses that five or more of the seniors had in common. We found some cohesive, salient groupings of coursework, and we found some with no clear set of relationships to the areas of learning assessed.

For those groups of courses associated with improvement in the areas of learning we examined, we began talking with the faculty members who taught the courses. Because the transcripts gave us the year, term, and section of the course, we were able to speak with the precise faculty member who taught the course to the students in our test groups. We asked these faculty members to reflect on what they did in their classes that might enhance a student's ability to respond to the GRE test questions, how they viewed the purpose of their course, what they stressed in evaluating student learning, and how they might advise students seeking to improve their skills and abilities in the areas assessed. In addition to the interviews, we asked these faculty members to provide us with course outlines, syllabi, and sample examinations when possible.

This research admittedly was exploratory. We were plowing new ground in attempting to link concrete academic experiences with explicit assessment results. What we have, then, are glimpses—rather than full portraits—of the courses themselves, the students who enrolled in them, and the faculty members who taught them. Nevertheless, we have moved from gross generalizations to some rather specific observations about

courses that seemed to have a particularly salient relationship to improved student learning in the areas we examined.

What we learned from the transcripts

Students do not gain much *common* intellectual experience from their formal undergraduate program. It means little to talk about the universal value of a baccalaureate degree at most colleges and universities, aside from major and minor specializations.

The curriculum is a moving target. Each year courses are added, dropped, redesigned, and renumbered. On the transcripts we examined, about 5 percent of courses taken in any one year were recent additions or pending discontinuance. Several of these courses did not even appear in the college catalogue or bulletin. Some may label this fickle dilettantism on the part of the faculty; others may extol this rate of change as a harbinger of innovation in teaching and learning. The fact remains that 20 percent of the courses that were available to today's seniors when they entered college are not offered now at the same institution to its first-year students.

While faculty members may not engage in rigorous preparation of goals and objectives for their courses, they do have a very clear vision of what students are to study and what they are to learn. This clear vision extends to the cognitive skills, norms, attitudes, behaviors, understanding, and mastery of the knowledge base that faculty members wish to develop in students.

While the purposefulness and clarity of intentions were manifest in nearly all the faculty members we interviewed, several predictable obstacles seem to impede their ends. The sheer size of lecture classes often militated against direct interaction with most students. Class size was cited frequently as a major limitation on what could be accomplished in instruction and in what reasonably could be asked of students in class assignments.

Findings, conclusions and discussion

Students gain from their undergraduate experience. They gain first and foremost in their ability to reason analytically. Students at or above the mean SAT scores were more likely to benefit from coursework than those below the mean SAT scores. This finding has serious implications. There is not—and probably should not be—a core curriculum reflecting coursework that is contributory to gains in the areas of general learning we examined. Instead, there appear to be learning subenvironments or learning communities particularly that are beneficial to students involved in them.

The student "subenvironments" that Ernest Pascarella and Patrick Terenzini talk about in *How College Affects Students* really do exist. Frankly, I prefer the more popular term, "learning communities," to subenvironments. By whatever term, however, students

of like interests and abilities have common curricular and extracurricular experiences. Even at small colleges, such "learning communities" were manifest in the coursework patterns of graduating seniors.

Students learn in groups. These groups do not draw strong lines between the curriculum and the extracurriculum. What makes a learning community productive? The question presumes a more meaningful response than does the one that asks how we can raise all students who were below the mean to some position above it. We must stop treating undergraduates *en masse* in curricular planning.

Some of the coursework patterns we found were associated with gains in general learning—at least in the way that they were defined in the project. Other courses were not associated with such gains. Our conceptions of what is general or liberal learning often have been driven by our sense of the structure and sequence of the disciplines. These date back to the medieval vision of the trivium and quadrivium: to the notion that certain subjects—grammar, logic, and rhetoric—were prerequisite to other types of learning. These suppositions are borne out in our notions of breadth and depth of the curriculum. Yet, when we examine the cognitive development of students (recall that the GRE constitutes a set of cognitive development measures), it becomes evident that there is no one-to-one correspondence between the disciplines and such development. Typical conceptions of the role and function of the disciplines, the uniformity of the undergraduate experience, the relationship of structure and sequence of courses, and the way breadth and depth are generated in the curriculum are not supported by our research.

Our search to provide depth and breadth in the undergraduate curriculum fails, perhaps, because our ways of understanding and conceptualizing the curriculum are failing us. Students entering college with lower abilities enroll in more survey and introductory courses than do other students. They have less chance of taking courses associated with gains in general learning than students at or above the mean of SAT scores at the same institution. What emerges is an image of the college curriculum geared to students at or above the mean of abilities. We need to examine further what learning experiences work for the less-able students.

The key is the match between student ability and teaching-learning environment. When that environment works in a cohesive, coherent, consistent way, student learning is more likely to occur. We cannot develop such person-environment fits uniformly across complex curricula. We cannot effectively assist students *en masse*. We also need to recognize that our ways of understanding and conceptualizing the curriculum have serious flaws. The calls for a core curriculum miss the point. We know that one educational shoe does not fit all.

We are approaching a point in thinking about the college curriculum that I think

is comparable to the shift from Ptolemaic to Copernican cosmologies. Viewing the curriculum linearly and hierarchically, with specific roles for specific subjects and sequences, does not match the developmental sequence of the majority of our students. It might be better to view the curriculum as a patchwork quilt of many fabrics.

For instance, we find that the quantitative methods course work of many disciplines contributes to the development of quantitative abilities of students; the philosophy and theory courses within fields as disparate as physics and law impart the mental rigor and the axiomatic structure for analyzing and interpreting phenomena. This characterization of the curriculum and its relationship to student learning is more meaningful than one that assigns a certain functionality to specific disciplines (for example, that students learn to write in English classes and to be numerically analytical in math classes).

We are engaged in a rethinking of how to conceptualize undergraduate education so that it can guide curricular reform or interpret the effect of the formal curriculum on student learning. Learning communities consist not only of formal coursework directly pertinent to the areas of learning gains but also related course work, residential living experiences, and extracurricular activities that provide cohesion to the student group.

To rethink general education using what we learn from assessing students' cognitive development in college, we must reexamine the structure, content, processes, actors, and activities involved. This calls for taking seriously assessment of learning rather than presuming that learning occurs when bright faculty members teach bright students. It calls for:

- recognizing, supporting, and rewarding teaching assistants' role in the general-education program
- removing the disincentives to teaching—present in all types of institutions—through the provision of rewards for good teaching that are comparable to those for good research and publications
- identifying and reinforcing learning communities within the general-education program
- redirecting instruction toward the education of all students, not just the most able
- developing a stronger relationship between curriculum and extracurriculum and the teaching and learning process.

Embedded in these recommendations is the recognition that differences in student learning are greater within institutions than between them. Here again, assessment can help us to identify the curricular sequences that work for low-ability students, high-ability students, transfer students, or students from a particular school or college within the university. By recognizing the effective learning communities already implicit in our college environments, we can begin to capitalize on their strengths and minimize their weaknesses.

The assessment question no longer is, "How well are we doing?" It is, rather, "Where are we doing well and where can we improve our general-education program?" I

believe that through the dynamic linkage of the courses students take and the learning they demonstrate, an assessment program in general education can be crafted that holds great promise for improving collegiate teaching and learning.

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ZELDA F. GAMSON

THE REALPOLITIK OF REFORMING GENERAL EDUCATION

Curricular change, especially in general education, is *organizational change*. It plays into the political economy of colleges and universities, in which enrollments determine—more or less directly—the number of lines in a department. And the number of lines determines how many faculty members will be in a department. New general-education requirements mean that some departments gain, and others lose, in this political economy. It is no wonder, then, that despite their best intentions, departments get into "turf battles" once the general-education campaign begins in earnest.

The vast majority of colleges and universities in this country do general education through distribution or "cafeteria" systems: so many courses from Column A, which can be met through courses from Departments 1–5; so many courses from Column B, available through Departments 6–10; and so on. Even if they do not start out this way, general-education programs tend to evolve into distribution systems, as departments vie to have more and more of their courses become eligible for meeting general-education requirements.

Why does general education through distribution have such survival value? Distribution systems operate as markets that roughly equalize the enrollment benefits and costs of general education. In doing so, they dampen the interdepartmental conflict that almost always occurs when changes are contemplated. Distribution systems also are simple to implement: Print up the requirements in the college catalog and let the students choose. More prescriptive general-education programs are difficult to implement. They not only require shifts in the distribution of lines and responsibilities among departments; they also imply changes in almost every office of the institution—such as advising and orientation, room scheduling and the registrar, publications and the library.

If general education is so hard to change, why do colleges and universities keep trying to do it? They do, again and again. In our study of the implementation of changes in general education in New England comprehensive and less-selective colleges and universities, my colleagues and I have found that many institutions have spent thousands of person-hours deliberating about general education. Several have gone through this arduous process more than once in the last decade (Kanter, London, and Gamson, 1990).

Even when a new curriculum is approved widely by the faculty, it is unlikely to be implemented properly. There is little planning for implementation ahead of time. Few resources are set aside for implementation, and whatever is set aside is vulnerable to raiding. Students rarely are involved in discussions of general education, nor is the impact of general education on students typically assessed.

In many ways, general education is a classic organizational "garbage can" (Cohen,

March, and Olsen, 1972; Meyer and Rowan, 1977). Administrators use general education to solve problems of enrollments, faculty morale, and finances. Most important, they use general education to demonstrate legitimacy: *Their* institution is taking undergraduate education seriously. It doesn't hurt that being associated with an interesting general-education program, however poorly implemented or unclear in its impact on students, sounds good at conferences and looks even better on a resumé.

For faculty members, general education has strong symbolic meaning. They want to do a good job in general education. It takes them back to the reasons they went into the academic life in the first place. It gives them hope that all is not lost with Western Civilization, Democracy, and the Globe.

Faculty members who serve on the general-education committees that are established to come up with a new program become real believers. They get excited about working with colleagues from other disciplines and reading new materials on higher education. It is difficult for them to convey their excitement, however, to their departmental colleagues who have not gone through the experience, and after a few years they forget what it was all about. If their curriculum proposal is either rejected or not implemented properly, many end up embittered and withdraw from institutional involvement.

Is it worth trying to change general education? If faculty members and administrators are serious about reforming undergraduate education, they probably will achieve more by focusing on improving pedagogy and creating new structures, such as learning communities (Chickering and Gamson, 1991; Gabelnick, MacGregor, Matthews, and Smith, 1990; Gamson, 1984). There are, however, other reasons for reviewing general-education programs.

As a periodic ritual for the faculty, I think it probably is worth the effort. It is important for faculty members to look past their disciplinary blinders from time to time. Contemplating general education can be an important general education for faculty members. In some cases, it builds colleagueship and community across departments and schools. And, not least in these times of fragmentation, it focuses attention on the significance of the institution as a whole.

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REPORTS FROM THE FIELD

Each of the twenty teams selected to participate in the Asheville Institute on General Education was required to write a report—long enough after the Institute for reflective evaluation—on the impact of the week's work; what the team had learned, decided, or experienced; and how that will affect their general-education reform. These reports were submitted in September 1991. They provide valuable insight into the work of reform at twenty American colleges and universities that vary widely in size, governance, and almost every other dimension. What the institutions have in common is that they offer at least four-year degrees and there is a dynamic concern for improving general education among their faculty and administration.

The variety of reports is testimony, in part, to the variety of projects underway at these institutions. Achieving this heterogeneity was a central part of the selection process. The organizers believed that the best mix for fruitful change at the Institute would include institutions both large and small, coeducational and single-sex, public and private, with a wide range of selectivity and student population.

There was an equally wide range of projects being pursued at the Asheville Institute itself. Some institutions were evaluating and refining general-education programs (usually of recent provenance) already in place; others were planning ambitious new curricula. Some institutions were planning for change in history and culture, others in science and mathematics, still others in both areas. There were colleges working on designing one new general-education course. Others engaged in a profound rethinking of their mission. For one institution, implementation—including the difficult political issues involved—might be at the head of the agenda; at another, the best way of assessing an already implemented curriculum would be the leading issue.

The final reports, predictably, reveal this same range of achievements, assessments of the Institute, and judgments of success.

GENERAL REACTIONS

Some of the general reactions clearly have wide applicability. There is, for instance, the lesson of pursuing managable goals. The Ithaca College report, for instance, comments on limits:

> *Echoing Henry David Thoreau's advice to "simplify, simplify," speakers and consultants at the Institute advised against complicated curricular changes that might not yield substantial results. Indeed, both explicitly and by implication a central message of the Institute seemed to be the need for participants to focus on meaningful, achievable change.*

This note was struck repeatedly, as teams whose aims were overambitious found it best to narrow them; they felt more likely to achieve these narrowed aims.

A number of the teams wrote of the encouragement they received from coming together with like-minded colleagues from other institutions. The St. Joseph's College report remarks:

> *Some of us had not realized how extensive the present movement is and how many colleges are engaged in the development or revision of general education.*

Likewise, the New England College team

> *discovered that, after all, we are not alone. Our problems, past and present, are shared by many institutions. We shared insights, experiences, and horror stories. We discovered that New England College is farther along the general-education implementation route than the majority of other institutions at the Institute and is near the forefront of general-education reform nationwide. This finding, after years of wrenching efforts to build the program, was most heartening.*

Similar comments came from a number of other institutions that had profited from the discovery that their problems, needs, and aims are shared by others: that they are part of a movement.

> *Two of Wilmington's team members had been deeply involved in general-education reform since 1987. For them, the Institute provided an opportunity to reflect on that process, compare their efforts, successful and unsuccessful, with those of other colleges and universities, and shift from issues of conceptualization to implementation.*

Other institutions also reported the satisfaction of discovering that their institution's efforts were perceived as exemplary.

> *[Western State College] received acknowledgment of the uniqueness, creativity, and dynamism of our program. Consultants and representatives from other institutions indicated that they believed we are well on the way toward having an effective undergraduate Core and General Studies Program.*

As for the specific projects which brought them to Asheville, some teams were more concerned with refining than inventing. Southern Illinois University–Edwardsville had as its first agenda item:

> *Examine the current General Education Program to determine if it is achieving its intended goals. Compare the existing program to the newly adopted Statement of Objectives for General Education and the Baccalaureate Degree and suggest appropriate changes.*

Suggested changes did arise from this refinement. The same was true for New England College, which—in addition to outlining specific structural and curricular changes—declared that:

> *We have begun working on an articulation of the program and the purposes it is meant to achieve. This statement will be informed by the original discussion about the program before its inception, as well as lessons learned in the past two years.*

New England College is one of the institutions proposing new courses; they have proposed a new general-education course in the natural sciences

> *replacing the multitude of courses offered under this category with one course that offers field experience and theoretical discussion of the role of science in society.*

Likewise, Louisiana State University's team worked on new courses, including a two-semester course in Western and non-Western civilizations that will be piloted in 1991, and a new course perhaps titled "The Emergence of Science," which

> *would satisfy three hours of the General Education science requirement and be a worthy successor to the two [civilization] courses already listed.*

Several institutions were working on freshman seminars or capstone courses. Ithaca College's plans for improving general education include

> *a freshman seminar-type program as the centerpiece of a coherent freshman year experience...characterized by small classes, active learning, greater attention to written and oral skills, and inclusion of transition to college-type issues.*

The University of Tennessee–Chattanooga team aims to

> *utilize the Freshman Seminar as an essential base for undergraduate curricular planning and for cohort group formation.*

The University of the Pacific's report describes the current state of thinking about the capstone seminar, Mentor Seminar III:

> *We have made contacts with the Institute for Global Ethics...to discuss the content of such a capstone were it to focus on ethics. We are also considering the incorporation of several of the autobiographical exercises which Warren Wilson College presented during the Asheville Institute.*

Warren Wilson College, which has an ambitious review of its entire general-education program underway, reported that

> *we found support for the sense that the general education program should run through all four years of college, that it should include freshman and senior transition components, and that it should encourage integrative understanding.*

These descriptions share a common understanding that marks many of the institutional reports, as it marked the discussions during the Institute: a recognition of interconnectedness, particularly the interdependence of content and teaching and learning styles. Breaking down barriers between the disciplines, between a focus on content mastery and an understanding of teaching methods, was accompanied by an interest in joining the official curriculum and the "implicit curriculum," to use Alexander Astin's phrase. For some, this means thinking of what happens outside of class as an equally

important part of general education. The University of Tennessee–Chattanooga plan includes

> *regularly scheduled co-curricular interdisciplinary academic fairs*

and the Western State College team writes of the strategy of

> *making general education a more central part of the college culture by a series of changes outside the formal curriculum. A college's core values have to be reinforced in student activities and campus events, in faculty personnel policies and a dozen other areas, and not simply stand alone in a core curriculum.*

THEMES

Some of the themes to which the teams specifically addressed themselves were very widely shared; others were much more specialized. Surprisingly, only one of the twenty teams had as its main project *multicultural* curriculum reform. The team from Grand Valley State University reported the difficulties attendant on that project, as well as on feeling isolated by their focus:

> *What we took to be a central issue for reform in relation to general education was not shared by most of the participants.*

Beyond that, their report speaks to the challenge of multicultural reform:

> *We also discovered that issues relating to multicultural reform are fraught with astonishing emotional components that seem to derive from "where we live" and "who we are"—from our very membership in a culture that is struggling to deal with issues relating to race; from our various social locations and histories as members of this culture; and from our sincere desire to do the right thing.*

It is surprising that such an important direction for reform received no more explicit attention from the participating institutions. Equally surprising in another way was the fairly muted discussion of issues of interdisciplinarity. Many of the institutions, very likely, already have some measure of interdisciplinarity in general-education courses in history and culture, and integrative learning is a key topic for freshman seminars and capstone courses.

> *Louisiana State University initially planned to work on how to make our freshman interdisciplinary biological science more effective in fulfilling the purposes of the General Education requirement.*

Somewhat to their surprise, apparently, team members went considerably beyond that aim:

> *We turned to the possibility of creating a history of culture and science course that would satisfy three hours of the General Education science course and be a worthy successor to the two courses already listed.*

In addition to drafting a possible syllabus for this course, the team suggested team-teaching arrangements under which professors from Arts and Sciences would share lectures with faculty members from LSU's scientific colleges.

Stillman College's interest in interdisciplinarity grows out of its experience in writing-across-the-curriculum efforts. Stillman's report states:

> *There is a great need for student involvement in the synthesizing of ideas, not just the parsing of facts. Students need to participate actively in their education, and isolating each discipline tends to lower that participation.*

Stillman continues to work on teaching ethics-across-the-curriculum, an undertaking which aims to incorporate ethical considerations in all the courses in the curriculum and to combine content and interaction.

Although not every attempt to improve science education is interdisciplinary, attention to science and mathematics was an important theme of the Institute. Franklin and Marshall College, for instance, came with a dual goal: improving learning in foreign languages and responding to

> *the issue of how to improve the quality and depth of the science education of students who choose not to major in the sciences.*

The solution they have reached is to increase their science requirement and to insist on more continuity, or study-in-depth, in one of the sciences.

Roanoke College likewise worked on science, specifically on

> *intensifying support for faculty initiatives to improve introductory science and mathematics courses. One main goal in these improvements is to enable students to understand these disciplines as ways of thinking and problem-solving rather than as masses of data and formulae to be memorized. A second main goal is to enable students to be comfortable enough with the content and methods of science and mathematics to wisely make the decisions citizens in a democracy are called upon to make about issues of science and technology. Encouraging active learning and communication skills are important pedagogical goals.*

The College of St. Catherine, recognizing some of the same educational goals in its general-education science courses, aims to develop an interdisciplinary science course for nonscientists and agreed

> *that these goals would best be met by courses that treated a few topics of significant public interest (acid rain, toxic wastes, global warming, nutrition, etc.) from a variety of viewpoints over a significant part of a semester.*

Wilmington College's team likewise

> *reached the conclusion that their goal of an interdisciplinary course for all students was valid and attainable, albeit challenging.*

IMPLEMENTATION

A variety of strategies for implementing change in general education appear in the reports as campus teams plan ways to ensure the best chances of success. Some of these involve traditional issues of campus governance—politics, even—while others are more theoretical or more pedagogical. Howard University's report strikes an important generalizing note in emphasizing

> *recommendations in the area of faculty development, program evaluation and administration, student academic services, and other matters directly related to general education in the College of Arts and Sciences.*

The University of the Pacific's report testifies to the same kind of understanding—of how the general-education program must become interwoven with the most important fibers of the institution—in its strong statement of devices for implementation:

> *After reflecting on successes of other institutions, we conclude that general education must be more fully integrated into the entire life of our university. Top administrators should publicly articulate and endorse the program. Record keeping and registration procedures should be adapted to facilitate implementation. General education should become a significant part of the university image and be prominent in public relations, admissions, and student affairs initiatives.*

More concretely, Southern Illinois University–Edwardsville recommends that general education be given administrative presence by the establishment of a director of general education reporting to the provost.

Beyond the task of involving the administration, a number of institutions recognized the need for sharing the faith with other faculty members. Those who attended the Asheville Institute are enthusiasts, even initiates; their enthusiasm and feeling of "ownership" must be broadened to enlist more faculty members in the movement of reform. The Randolph-Macon team writes:

> *Our third step must be to fill the knowledge gap which has grown between the participants at the Asheville Institute and the remainder of the College community. We propose to conduct a series of luncheons and other programs where faculty and administrators are introduced to concepts such as cores, block plans, learning communities, etc.*

The report from Northeast Missouri State University comments eloquently on the potential gap between those who have been to the mountain and those who have not:

> *Getting beyond "curriculum engineering" means that NMSU can focus more purposefully on the conditions for learning—including faculty ownership of any plans we make together...bruising curriculum wars may sometimes be necessary, and a mountaintop curriculum has absolutely no chance if it is not changed significantly*

by all the faculty waiting in the valley below.

A key to enlisting this sort of ownership—not only by faculty and administration but by students and alumni—is effective communication, as a number of institutions recognized. The clearest statement of a communications plan appeared in the report from the University of the Pacific, which describes

> *a public relations campaign of sorts. The alumni newspaper was persuaded to write an extensive story on general education reform. The team briefed department chairs.... Admissions materials describing the new general education program and its contribution to education at Pacific are being prepared.... In sum, every attempt is being made to keep the reform in the campus eye and to solicit reactions to each area of reform.... We need to develop a way to incorporate students into the planning and review process. We hope to initiate a regular newsletter covering aspects of general education.... We will inaugurate workshops for faculty....*

All these implementation strategies are important. The most striking results, however—during the Institute and in the subsequent reports—exhibit an intense emphasis on pedagogical issues and on faculty development.

Alexander Astin's address, with its conclusion that *what* we teach in general education is considerably less important—as measured by change in students—than *how* we teach, helped to sound this theme, and it was supported by other speakers and consultants. Though most participants in the Institute are faculty members whose lives are organized around disciplinary concerns—that is, content issues—there was a powerful movement toward non-content-oriented reforms.

Two reports speak to the conversion faculty members experienced at Asheville. Wilmington College writes:

> *The emphasis the Institute placed on pedagogical issues, such as cooperative learning, was beneficial to all. Too frequently, professors focus on the "what" of a course without giving much thought to "how" learning might best take place.*

The Ithaca College report tells how

> *From an almost exclusive focus on coursework, we began to discuss both the learning environment and the "scaffolding" (another useful metaphor from the Institute) necessary when considering curricular revisions.*

A number of the colleges and universities now are more deeply committed to interactive learning and creative educational environments, including the use of learning communities. Randolph-Macon's summary of the importance of the *how* speaks eloquently for many, perhaps all, participants:

> *The key idea which we are bringing back from the Institute is the notion that effective general education and effective general education curricula are not synonymous phrases. There are many paths to satisfying our curricular philosophy. While*

we will continue to examine our curriculum in order to better achieve our goals, one particular area of concentration for us will be implementing more active learning opportunities for our students, a pedagogical rather than curricular matter.

Along with a new or renewed commitment to effective teaching and learning as the center of general education came a recognition that faculty development is one of the crucial determinants of successful general education. Several of the participating teams made remarkable commitments to general education. The University of Arizona, for instance,

> *began with the idea that a central problem facing the General Education Program in the College of Arts and Sciences was course content.... During the week of speakers, consultations, and team meetings, however, the University of Arizona team concluded that these difficulties were symptoms of a more encompassing problem at our institution: the absence of an institutionalized structure to encourage and maintain faculty involvement in the general education of the undergraduate population.*

In fact, the report from the University of Arizona now describes a very thoroughly imagined and detailed program of faculty development, including changes in the university's structure, new efforts to connect faculty members teaching general education to agreed-upon purposes and objectives, and rewards and incentives for good general-education teaching.

Likewise, Northeast Missouri State's team

> *arrived in Asheville to study four key issues: freshman seminar models, interdisciplinary course content, assessment, and faculty development. At the end of the Institute, our focus was much more precise. We now plan to work on faculty development as the vehicle for improving achievement of the university's objectives in the liberal arts and sciences.*

A number of other reports bespeak the same recognition of the essential role of faculty development.

Like the other changes and illuminations described in the institutional reports, this one arose from a complex ferment of listening to key speakers and the resident consultants; the opportunity for the team to think seriously and cooperatively about campus problems (the reports are full of testimonies to the value of the "team time"); and the exchange with other institutions. The Western State College team wrote:

> *Other colleges with successful general-education programs encourage faculty members in all courses to rethink the ways they teach, the better to encourage students to become active learners, to connect content with their emotional lives, or to practice skills.*

The workshop week of the Asheville Institute gave participants an opportunity to

practice several learning styles. Lecture and discussion with specialists mixed with collaborative and interactive learning produced remarkable outcomes that even now are changing the educational climate on those twenty college and university campuses—and beyond.

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UNCA's student body currently numbers approximately 3,300, with a full-time equivalent enrollment of about 2,500.